



The human side of idea screening

Alexandre Sukhov

Faculty of Arts and Social Sciences

Business Administration

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Abstract

In extant research, idea screening has been viewed as a gate where ideas for innovations are evaluated and selected for further development. Given that organizations have limited resources, and cannot implement all of the ideas, idea screening acts as a bottleneck during the innovation process. Thus far, research studies have mainly focused on improving the efficiency and effectiveness of idea screening through e.g. crowdsourcing, improving its accuracy, and even developing algorithms that mimic human evaluations. However, this pursuit of technical and procedural optimization has only reinforced the perception of idea screening as a strict decision gate, limiting our understanding of this phenomenon. Consequentially, this has led to a gap between how idea screening is portrayed by research and what is happening during screening. The aim of this study is thus to explore idea screening from the evaluator's perspective in order to enrich our current understanding of this phenomenon and to reduce the gap between theory and practice. The methodological approach used was inspired by mixed methods research, and the empirical base consisted of a total of 1,305 idea screening cases performed by 245 people, focusing on technology-based ideas for innovations. The findings showed that evaluators did not just evaluate and select ideas for further development, but were engaged in generative activities that helped them to understand ideas and envision their future potential. This indicated that idea screening is not a strict decision gate, but is also a stage where ideas can be refined. The findings propose a change of logic as regards how to understand idea screening, and how to find ideas of high quality, i.e. good ideas are not created during idea generation, and then discovered during screening, they are instead created by the evaluators during screening. Recognising this opens up new opportunities for capturing activities that can improve screening.

Key words: comprehension, front end of innovation, generativity, idea screening, mechanisms, mixed methods research, sensemaking.

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Sincerely,

Alexandre Sukhov

List of appended papers

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https://doi.org/10.1142/9789813273382_0003

Study 2

Sukhov, A. (2018). The role of perceived comprehension in idea evaluation. *Creativity and Innovation Management*, 27(2), 183-195. *Top 20 most read paper in CIM (2017-2018)*.

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Study 3

Sukhov, A., Sihvonen, A., Olsson, L. E., & Magnusson, P. R. (2018). That Makes Sense to Me: Openness to Change and Sensemaking in Idea Screening. *International Journal of Innovation Management*, 22(8), 1840009.

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Study 4

Sukhov, A., Sihvonen, A., Netz, J., Olsson, L.E., & Magnusson, P. (Unpublished manuscript). Idea Screening: Explaining Activities, Modes and Processes. Previous versions were presented at the Academy of Management Paper Development Workshop in Boston, 2019, and at the 20th CINet Conference in Odense, 2019.

My contribution to the appended papers:

Study 1

Main author. Main responsibility for writing. Shared planning and review.

Study 2

Main author. Responsible for all parts of the study.

Study 3

Main author. Main responsibility for data collection and data analysis. Shared planning, review and writing.

Study 4

Main author. Main responsibility for planning and data analysis. Shared data collection, review and writing.

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1 Introduction

The purpose of this thesis is to explore the phenomenon of idea screening and expand current understanding of how people perceive ideas for innovation projects and determine their quality. Providing this knowledge base will inform researchers and innovation managers on the complex challenges related to the evaluation and selection of ideas, and provide insights into how to improve this process, with the emphasis on the human side of idea screening.

1.1 Background

In order for organizations to survive in a highly dynamic and changing environment, they need to innovate (Amabile, 1998; Katz, 2004; Rogers, 1995; Van de Ven, 1986). In practice, this means that organizations need to facilitate supporting activities aimed at obtaining new ideas, then developing these ideas into new products and/or processes and implementing them on a market (Amabile, 1988; Koen et al., 2002; Manual, 2018). However, during past decades, the main organizational challenge has not been on understanding how to generate ideas, but rather on the ability to identify ideas that could lead to successful new products (Hammedi et al., 2011; Kock et al., 2015; Owen, 2009). In fact, due to the relative ease of generating large quantities of ideas, while having limited resources within the organization, only a handful of ideas can be selected for implementation (Toubia and Florès, 2007). This makes idea screening a bottleneck during the innovation process, a bottleneck through which new ideas find their way into the organization, making idea screening particularly important for the organization's ability to innovate (Barczak et al., 2009; Kahn et al., 2013; Koen et al., 2001; Rogers, 1995).

People tasked with screening ideas (also referred to as evaluators) are said to engage in "a process of evaluating and selecting new ideas or concepts that can be put in the project portfolio" (Kahn et al., 2013: 469). According to Rogers (1995), different types of evaluation techniques can prevail within the organization when it comes to systematically approaching idea screening. Evaluators can come from the outside of the focal organization and represent independent views. Alternatively, evaluations can be entrusted to a collective of people within the organization, whereby consensus among these individuals becomes a priority. Screening can also be in the hands of a few experts and decision-makers, who see the intricate details and understand the organization's strategic intentions. It is also possible for an organization to employ a mix of different techniques, obtaining a hybrid approach that includes the different perspectives of the evaluators when it comes to finding the most promising ideas (Magnusson et al., 2016; Rogers, 1995).

Extant research has found that having a structured set of activities during the early stages of the innovation process leads to greater organizational performance (Barczak et al., 2009; Cooper, 2014; Kock et al., 2015; Ronkainen, 1985), and that

there needs to be more of a focus on improving the quality of idea screening (Van de Ven, 1986). This has prompted researchers to examine ways to increase the speed and accuracy of the screening process by outlining decision-making strategies (e.g. Eling et al., 2015; Hammedi et al., 2011); reducing the cost of screening, and increasing its capacity by outsourcing it to users (e.g. Magnusson et al., 2016; Ozer, 2009); or even looking for algorithms that help to automatize the process (e.g. Toubia and Florès, 2007).

However, despite the intentions of extant research to bring structure to the early phases of the innovation process, the role of those evaluating ideas, which lies at the heart of the idea screening phenomenon, has been largely overlooked (Dziallas, 2018). In the literature on new product development, evaluators are often reduced to their degree of domain knowledge/expertise (Denker, 2018; Moreau et al., 2001; von Hippel, 1994), evaluation quality is believed to be improved by applying a range of rational criteria (Dean et al., 2006; Kudrowitz and Wallace, 2013; Magnusson et al., 2014; Ronkainen, 1985), and the idea that is being evaluated is presumed to be a unit of information describing a problem with a technical solution (Florén and Frishammar, 2012; Kahn et al., 2013; Riedl et al., 2011). Research on idea screening is thus now being driven by a technical perspective, which emphasizes the role of procedures in decision-making given the desire to further optimize the process (e.g. Beretta, 2019; Hammedi et al., 2011; Kudrowitz and Wallace, 2013; Ronkainen, 1985).

This pursuit of improving organizational performance has created a stronger push towards theoretical generalizations in research, and the belief that it is possible to obtain straightforward explanations for complex empirical phenomena (Eling and Herstatt, 2017; Tidd and Bessant, 2018; Trott and Hartmann, 2009). Specifically, this has almost exclusively resulted in research studies focusing on theory testing (emphasizing single significant factors) (Dziallas, 2018; Eling and Herstatt, 2017). Studies have also been noted as mainly recycling or repackaging earlier research, hence, failing to build new theory (Trott and Hartmann, 2009). In addition, innovation management research has also been notorious at following fashionable trends in the research field instead of focusing on some of the fundamental issues (Tidd and Bessant, 2018). As a consequence, the challenges relating to understanding complex phenomena that are pertinent to the innovation context (Ilori and Irefin, 1997; Van de Ven, 1986), and the building of theoretical explanations by applying different perspectives, have not been given attention (Alvesson and Sandberg, 2011; Tidd and Bessant, 2018). This has even resulted in a wider gap between existing theoretical models and innovation practice. Some researchers have discovered that practitioners do not act in accordance with popular theoretical explanations (Bromiley and Rau, 2019), and that the methods and approaches prescribed by research are simply not being followed due to the complex nature of the empirical phenomenon (Dziallas, 2018; Kihlander and Ritzén, 2012; Trott and Hartmann, 2009).

Due to this concern, there has been a call to widen the theoretical perspectives in order to better understand idea screening (Eling and Herstatt, 2017). Recently, studies have hinted that the evaluators' actions are formed by the way in which they perceive the idea (Stierand and Dörfler, 2016; Ulrich et al., 2015). This cannot purely be explained by the presence of domain knowledge, instead involving more intricate details of the evaluator's personal characteristics (Rogers, 1995; Weick, 1995). However, what these characteristics are and how they influence screening has not been made clear. Similarly, the notion of an idea for innovation has also been debated, suggesting that it acts as a unit for the inception and enablement of generative action rather than an early product description that is decided upon (Le Glatin et al., 2017; Le Masson and Magnusson, 2002; Ulrich et al., 2015). Furthermore, there has also been a call to study the evaluator's thought processes in contexts such as idea screening, in order to better understand how a decision/judgement is reached in practice (Hodgkinson and Sadler-Smith, 2018; Magnusson et al., 2014). Thus, there is a need for research in order to further validate and expand our conception of these processes in order to build better explanations.

According to Tidd and Bessant (2018), research in the field of innovation management should not exclusively focus on improving the businesses in terms of efficiency and profitability. Research needs to provide managers and policymakers with a better theoretical understanding of the fundamental challenges facing innovation management. Therefore, the focus should be put on a more grounded understanding of the processes, e.g. idea screening, and on creating a comprehensive knowledge base around them (Eling and Herstatt, 2017). The aim of this thesis, therefore, is to examine idea screening from the evaluator's perspective in order to obtain a more human centric view of the screening process. Doing so will help to shed light on the puzzling early stages of the innovation process (Eling and Herstatt, 2017), and help managers to know how to utilize human resources in order to improve the flow of new ideas into the organization.

1.2 Research questions

What is clear from previous research is that there is a need to examine idea screening more closely in order to better understand the complexity that evaluators face when undertaking this task (Eling and Herstatt, 2017; Hodgkinson and Sadler-Smith, 2018). Drawing inspiration from the innovation-decision framework of Rogers (1995), I have decided to focus on three main elements of idea screening, at the point of making a judgement: 1) the idea (as this is the unit being evaluated), 2) the evaluator (as this is the entity doing the evaluation), and 3) the process of evaluating (as this helps us to understand how the evaluator produces judgements).

The current understanding of idea screening in the new product development literature is mainly orientated towards the notion that evaluators are able to determine

and select high quality ideas (Kahn et al., 2013). In this discourse, ideas are viewed as ‘embryos for a new product or service’ and treated as objects that travel through the innovation funnel (Chesbrough et al., 2014; Cooper, 2014). This view acknowledges that the ideas are inherently incomplete. Simultaneously, it connotes that ideas have a functional nature and that the reason for generating ideas for innovation is their future implementation (Dean et al., 2006; Kahn et al., 2013; Riedl et al., 2011). However, this conceptualization can be perceived as contradictory. For instance, if an idea is understood to be an embryo, it will be recognized as an object which is not fully defined but which can be made into something (Hatchuel and Weil, 2009). While when an idea is simultaneously referred to as an explicit description of a problem, with a corresponding solution (Riedl et al., 2011), this implies that ideas are objects that can be judged as ‘good’ or ‘bad’, despite their early stage of development (e.g. Licuanan et al., 2007). In order to approach this issue, I have constructed the following research question to guide this research:

Research question 1: What are the components of an idea for innovation and how do they affect screening?

Addressing this question enables clarification of the role of an idea during the early stages of the innovation process, and is necessary when it comes to understanding what is being evaluated. In examining what constitutes an idea for innovation, and what its components are, it becomes possible to understand what constitutes as a ‘good idea’.

Another key component of idea screening is the person doing the screening; for this reason, I have decided to zoom further in on the role of the evaluator. The existing literature has mainly focused on the evaluator’s domain knowledge (defined as facts, information, and skills gained from experience within a particular area) as a predictor for his/her behaviour during screening (Eling and Herstatt, 2017; Ozer, 2009; Toubia and Florès, 2007). Accordingly, evaluators are referred to as knowledge entities which, ideally, are able to understand the value of an idea from the user-perspective, as well as an idea’s producibility from the producer perspective (Denker, 2018; Luthje and Herstatt, 2004; Magnusson, 2009). Following this logic, studies have relied heavily on the consensual assessment technique (see, for example, Beretta, 2019; Onarheim and Christensen, 2012; Trischler et al., 2018), where a majority vote by a number of experts determines whether the idea is of high or low quality on the basis of these experts’ collective knowledge base (Amabile, 1982; Baer and McKool, 2009). Although this approach has been widely used, it reduces evaluators to a single quality, i.e. their domain knowledge, and disregards their individual differences, i.e. values, beliefs, attitudes, and personality traits, which have also been suggested to influence idea screening (Eling and Herstatt, 2017; Rogers, 1995). Instead, the domain knowledge perspective emphasizes the appropriateness of the evaluator in making judgements and selecting the right ideas, rather than on providing insight into how the ideas are perceived by

different individuals. Given that the consensual assessment technique does not tackle the issue of understanding the different perspectives existing among evaluators, and that, in practice, even experts can disagree with each other, investigating the individual differences between the evaluators is essential in order to understand why people can have differing perceptions of idea quality (Eling and Herstatt, 2017). For this reason, the second research question is formulated thus:

Research question 2: How do evaluators' personal characteristics influence idea screening?

In addressing this research question, a more human-centric and nuanced view of idea screening can be obtained, and new insights regarding the evaluators' behaviours can be elaborated upon. Understanding this could help reorient research into new product development and explain situations where experts with similar domain knowledge view ideas in different ways.

In addition to understanding the characteristics of an idea and of an evaluator, the cognitive processes of the evaluator, in respect of the idea, require further attention. Given that Rogers (1995) has suggested that there are influences originating from the social context in which the idea screening occurs, it is interesting to see to what extent this is reflected in idea screening activities. Currently, screening is being examined through the perspectives of intuition and the reflective analysis of idea quality (Eling et al., 2015). Both intuition and analysis are anchored in a decision-orientated logic, which means that the evaluator is assumed to reach a go/no-go decision about the idea using different types of thinking styles powered by existing knowledge. However, since new ideas can be ill-defined and ambiguous (Hammedi et al., 2011), the process of screening can consist of other activities that influences judgement. According to Ring and Rands (1989), how an individual perceives a situation can influence any further actions undertaken by that individual. This suggests that idea screening could also be understood using the sensemaking approach (Le Glatin et al., 2017; Ulrich et al., 2015; Weick et al., 2005), which can help as regards outlining other activities associated with screening and expand our conception of this process. Moreover, current research does not provide a clear description of how evaluators cycle between different modes of reasoning during screening (Hodgkinson and Sadler-Smith, 2018), which motivates the third research question:

Research question 3: What activities do evaluators engage in when screening ideas and how do they perceive idea quality?

Together, these research questions enable me to build a comprehensive understanding of the human role during idea screening and to expand the current conceptualization of idea screening in the new product development discourse.

In order to answer the research questions and address the overall aim, I investigate the phenomenon of idea screening via a compilation of empirical studies. This approach helps me to inform theory, based on empirical observations, and to outline

the common conditions affecting the evaluators' perceptions of idea quality. The research methodology consists of an emergent design, where each study leads to new insights and helps the researcher to reflect on and redirect the following steps based on observations. Centred on this approach, the technical decision-making framework of idea screening is thus complemented with the perspective of sense-making, which extends our understanding of the idea screening phenomenon. Furthermore, this also leads to a discussion on how ideas are understood by evaluators and to what extent the ideas can be discovered or socially constructed (Foss and Klein, 2017). This discussion shifts the traditional conception of idea screening away from technical automation, where the evaluator can be replaced by a different entity (Toubia and Florès, 2007), towards the principal role of individuals in screening and their ability to assess and actualize the idea's potential (Ramoglou and Tsang, 2016).

1.3 Key contributions

By addressing the overall aim, and by exploring the research questions, this thesis makes the following contributions. First, through this thesis, a clarified conceptualization of an 'idea for innovation' is developed, which resolves current tensions between its existing understandings. This provides a clearer basis for researchers to study ideas and understand how ideas progress during the innovation process.

Second, the thesis proposes a typology for identifying the evaluators on the basis of their human values (openness to change and conservatism), as these values appear to explain the differences in the expert evaluators' behaviour with regard to how they screen ideas, and how they approach the idea screening task.

Third, the findings show that there are a number of different ways in which an idea can be perceived to be of high quality, with some of the more general patterns regarding how evaluators think during screening being identified.

Finally, the main contribution made is the fact that the current theoretical framework of idea screening is expanded to include sensemaking, which emphasizes the evaluator's interaction with the idea. This expansion of perspective not only changes the way in which we understand idea screening, it also suggests a way in which idea screening can be conducted, putting a greater emphasis on the evaluator's generativity during screening, as this is found to be a core activity for determining idea quality.

1.4 Outline of the study

The argument made in this thesis is developed over six chapters. Following this introduction, which gives an overarching view of this thesis, Chapter 2 presents the theoretical background of the technical decision-making perspective in the new product development literature. In this way, the reader is introduced to the conventional way of thinking regarding idea screening. The main elements of idea screen-

ing, in the light of this perspective, are presented in the theoretical framework, and research opportunities are also outlined based on this perspective's limitations. Chapter 3 explains the methodological approach used in this thesis and describes the research design. Chapter 4 contains the findings, which were obtained via four individual studies that were conducted throughout the course of this thesis project. The findings are integrated further by means of identifying and reflecting on the three main reoccurring conditions, followed by the development of explanations for the mechanisms influencing idea screening. Chapter 5 addresses the three research questions and expands the theoretical framework of idea screening by building on the findings. This is followed by a discussion consolidating the expanded theoretical framework. Chapter 6, draws the main conclusions, provides with the managerial implications, outlines the main limitations and suggests avenues for future research.

2 Theoretical background

The aim of this chapter is to provide the reader with an understanding of current research on idea screening and to outline the mainstream perspective that has been applied to studying idea screening. This exposé is divided into six sections. First, the context of the innovation process is explained. This helps the reader to understand how idea screening fits into the larger innovation process. Second, the concept of idea screening is further elaborated upon. This helps to clarify the role of idea screening and how it has predominantly been viewed in previous research. Third, the concept of an idea for innovation and its current definitions in the literature are discussed. This familiarises the reader with the tensions existing between the multiple definitions that have been used to conceptualize an idea for innovation. Fourth, the attributes of the evaluators engaging in idea screening are elaborated upon, helping to highlight the limitations of current research in terms of understanding the people involved in idea screening. Fifth, current understanding of the processes involved in idea screening is described. This also helps the reader to obtain an overview of the main approaches used to describe the cognitive processes occurring during idea evaluation. Finally, this chapter concludes with a theoretical framework that outlines the main elements of idea screening and indicates the assumptions of the technical perspective as regards to the idea, the evaluator, and the evaluation process.

2.1 Innovation process

The innovation process has been studied for decades and it has been conceptualized in a number of different ways (e.g. Chesbrough et al., 2014; Katz, 2004; Noble et al., 2014; Rogers, 1995). Despite the diversity of different schools of thought (Brown and Eisenhardt, 1995; see also Koskela-Huotari et al., 2016), it has been understood as an act of creating a new product¹ that carries significant improvements, and requires work in order to bring an idea or a concept into its final form (Kahn et al., 2013). Koen et al. (2001) (see also Barczak et al., 2009; Cooper, 2014), outlined the three main phases of the innovation process: i) the front-end of innovation, ii) new product development, and iii) commercialization (see Figure 1). This conceptualization suggests that each phase has a dedicated profile, i.e.: i) working with ideas, ii) developing business cases, and iii) implementing the product. Further, each phase requires different types of resources in order to bring the initial ideas closer to implementation, and to thus move ideas along through the process. Although this conceptualization shows a sequence of ordered phases, an innovation process can in practice be highly iterative (within and between each

¹ [Author] also service, process, method or other form of value offering.

phase) (Gurcaylilar-Yenidogan and Aksoy, 2018), and can be informed by societal needs (needs of the marketplace), as well as the state of technology and organizational challenges (Rogers, 1995; Tidd and Bessant, 2009). This means that an innovation process does not contain a rigid set of activities, instead illuminating the types of activities that an organization needs to have in order to be capable of continuous innovation (Amabile, 1998; Bessant and Francis, 1999), with the outline of the process also potentially being affected by the context in which it occurs.

Figure 1. A simplified version of the innovation process (adapted from Koen et al., 2001; also Cooper, 2014).



The front end of innovation has been characterised as particularly chaotic, experimental and unpredictable (Koen et al., 2001). During this phase, the evaluators may experience high levels of risk and uncertainty since the outcomes of implementing new ideas cannot be known in advance (Hammedi et al., 2011; Kock et al., 2015; Van de Ven, 1986). Usually, activities that are involved during the front-end phase are highly explorative and consist of market analysis, opportunity identification, idea generation, idea refinement and idea screening (Alam, 2006; Eling and Herstatt, 2017; Florén and Frishammar, 2012). These activities are described as being inherently fuzzy, but guided by the goal of gradually reducing uncertainty in relation to the innovation project (Chang et al., 2007; Florén and Frishammar, 2012; Frishammar et al., 2011). Moreover, as the idea progresses through this process, and a more concrete product description is formulated, internal support, in terms of organizational commitment, becomes an important part of the process and helps to move the idea closer to implementation (Florén and Frishammar, 2012; Kihlander and Ritzén, 2012).

The following phase, new product development, involves activities aimed at further developing concepts for new products or processes, building business cases, and testing and validating early concepts (Cooper, 2014; Koen et al., 2001). In other words, the ideas that were generated and selected during the front-end phase, could be e.g. materialized into concrete products through prototyping, further improving the product design, and specifying the production process requirements (Suh, 2001). Thus, new product development puts high emphasis on the participation of various stakeholders, the formation of project teams, material and engineering costs, and the analysis of future market profitability (Ronkainen, 1985). A popular approach to new product development is the stage-gate model (Cooper, 1994; Cooper, 2014). The stage-gate model has also been used as a way of understanding

the innovation process as sets of procedures from a top-down organizational perspective (Cooper and Sommer, 2016). The core of this model is the presence of multiple stages and gates throughout the entire innovation process, and decisions being made at each gate regarding the continuation or discontinuation of the innovation project. In this way, a decision to discontinue a project could be made before major investment is involved (stage-gate process acting as a funnel), something which can protect the organization from additional costs by stopping the development of unprofitable projects (Cooper, 1994).

The third phase of the innovation process involves the commercialization of the developed idea and taking it to a market (Kahn et al., 2013). Depending on the complexity of the project, it can range between rapid implementation in the workplace (e.g. improving the structure of meetings at an organization by implementing a meeting agenda with specific rules), and an extensive market launch on a global scale with advertising campaigns (e.g. introducing a new mobile telecommunications device) (Cooper, 2014). Commercialization often involves production launches, promotion, the development of marketing materials and programs, supply chain architecture, training, and development of service and support (Kahn et al., 2013). The output of commercialization is the implemented product, whose performance can be traced and evaluated in order to conclude whether or not the idea was a success (Barczak et al., 2009; Barczak, 1995). Furthermore, Barczak et al. (2009) and Kock et al. (2015) state that the successful innovation strategies usually involve a portfolio of new ideas/products that are implemented on a market, which means that organizations should strive towards selecting and implementing a diversity of different ideas in order to ensure portfolio success.

Given that the main focus of this study is on understanding idea screening, which is a part of the front end of innovation activities, the following section further elaborates how idea screening has been conceptualized in extant research.

2.2 Idea screening

Despite the iterations of the front-end activities, and the time it takes to generate new ideas, decisions need to be made at some point regarding which new ideas should be further developed into products. Idea screening has been defined as “a process of evaluating and selecting new ideas or concepts that can be put in the project portfolio” (Kahn et al., 2013: 469). Idea screening often acts as the gate between the front-end and the new product development phases, where ideas receive their formal evaluation. During screening, the evaluators make their initial decisions as regards whether or not to spend resources (time or money) on the project being proposed by the idea and thus bring it to life (Kahn et al., 2013; Koen et al., 2001; Cooper, 2014). This makes idea screening a bottleneck during the innovation process, since the flow of ideas is restricted by the organization’s resources and its capacity to select ideas for further development (Toubia and Florès, 2007).

In the extant literature, idea screening is usually referred to as a formalized process whereby people engage in the evaluation of ideas, in order to identify the ideas that have the greatest potential. However, the terms ‘evaluation’ and ‘assessment’ have also been used interchangeably in the literature to describe screening (e.g. Licuanan et al., 2007; Schulze et al., 2012). In order to reduce confusion, it is important to clarify the differences between these concepts. This study will refer to ‘evaluation’ as the cognitive process of determining an idea’s potential value, and which results in a judgment, since it is most often used in this context (e.g. Blair and Mumford, 2007; Eling et al., 2015). ‘Screening’ and ‘assessment’, on the other hand, are more often used in the management literature to describe the general procedure (or gate) occurring during the innovation process (Cooper, 2014). Therefore, screening is the more inclusive term, and may involve various tools (e.g. predefined criteria), techniques (e.g. outsourcing), and evaluation approaches (e.g. intuition/analysis) that are used to make a judgement regarding idea quality.

The challenges associated with idea screening have always been associated with the high degree of uncertainty experienced by the evaluators, partly due to ambiguous descriptions of underdeveloped ideas (Chang et al., 2007; Frishammar et al., 2011) and partly due to highly original or radical ideas that are difficult to compare to existing products (Deichmann and Ende, 2013; Koen et al., 2001; Le Masson et al., 2019; Moreau et al., 2001). Due to this uncertainty, the evaluators can experience difficulty understanding ideas, and the inability to relate them to existing product categories (Moreau et al., 2001), possibly resulting in a negative attitude towards new ideas (Licuanan et al., 2007; Rogers, 1995; Van de Ven, 1986).

In order to help reduce the uncertainty associated with idea screening, researchers have been suggesting for a long time a rational and systematic approach to determining idea quality (Le Masson et al., 2019; Ronkainen, 1985; Van de Ven, 1986). This approach has been driven by the desire to understand the common criteria used by managers when evaluating ideas (Ronkainen, 1985), and it has inspired numerous idea screening studies (Balachandra and Friar, 1997; Carbonell-Foulquie et al., 2004; Frederiksen and Knudsen, 2017). It has been suggested that using criteria helps evaluators determine how well ideas perform from different perspectives (Carbonell-Foulquie et al., 2004; Dean et al., 2006), and thus shielding the evaluators from systemic prejudices driven by personal opinions and attitudes (Le Masson et al., 2019; Van de Ven, 1986). Implementing a formalized and structured approach to front-end activities, e.g. using idea screening criteria, has also been shown to lead to more successful products coming into the marketplace (Barczak et al., 2009; Kock et al., 2015). Thus, idea screening has been outlined as an important part of the innovation process requiring further attention on the part of researchers in order to improve it in terms of quality (Van de Ven, 1986).

During idea screening it is important to select the ideas with the highest potential, however, despite the existing body of research, studies are not always clear on what

constitutes as an idea for innovation. In order to clarify this, the following section introduces ways in which some of the previous studies have defined ideas, and identifies tensions between these definitions.

2.3 An idea for innovation

In the innovation management and new product development literature, a number of explanations have been applied to describe what constitutes an idea for innovation. For instance, Riedl et al. (2011) refers to it as:

“An explicit description of an invention or a problem solution with the intention of implementation as a new and improved product, service or process within the organization.” – Riedl et al. (2011: 5).

This definition describes an idea as an object that contains an explicit description of how a certain problem could be solved. This definition also implies that an idea has a functional connotation since its purpose is to identify a certain area for improvement, and to describe an implementable solution. Upon implementation, an idea also needs to significantly improve the existing state of affairs within the organization, something which also needs to be taken into consideration as early on as during idea screening. Using a similar logic, Dean et al. (2006), explain that an idea needs to contain information on the what, where, when, who, why and how of a problem resolution, emphasizing that an idea needs to have an explicit description. Additionally, Dean et al. (2006) outline the fact that, in order for an idea to have high quality, it needs to be applied to a problem in hand, to provide an effective solution, and to be implementable. However, an idea's degree of originality is not necessary for the idea to have high quality, instead acting as an element signifying that idea's creativity/innovativeness (Dean et al., 2006).

Another way of defining an idea for innovation has been provided by Kahn et al. (2013), who refers to it as:

“The most embryonic form of a new product or service. It often consists of a high-level view of the envisioned solution needed to solve the problem identified by a person, team or firm.” - Kahn et al. (2013: 453).

Kahn et al. (2013), explain the above-mentioned definition by emphasizing the idea's early 'embryonic' form, whereby an idea's explicit description and detail have not yet been made evident at this early stage of the innovation process. This definition differs from Riedl et al. (2011) and Dean et al. (2006); specifically, it differs in terms of the idea's information content, and how detailed an idea should be. For instance, Dean et al. (2006) outlines specific dimensions for the information that the idea needs to provide, while Kahn et al. (2013) is not clear about it. In line with the 'embryo' perspective, Hatchuel and Weil (2009) refer to ideas as descriptions of objects that have not been completely defined, and whose conditions of existence have not completely become known. For instance, the viability of an idea

for a Mg-CO₂ engine for Mars missions cannot be known in advance, i.e. until more specific design parameters have been given in the description (Hatchuel and Weil, 2009). Hence, from this definition, ideas for innovations are entities that require further expansion by experts in order to become viable ‘problem solutions’ (Liu et al., 2014). This notion of an ‘embryo’ emphasizes the future development of an idea occurring during the ensuing steps of the innovation process. However, it also suggests a ‘high-level view of an envisioned solution’, which points to the idea creator’s ability to understand and envision the final product as early on as during the idea’s early shape, thus relating to an idea as an underdeveloped object.

Additionally, an abundance of studies of idea screening provide little clarification of what constitutes an idea for innovation (e.g. Diehl and Stroebe, 1987; Luthje and Herstatt, 2004; Magnusson, 2009). Studies either refer to ideas as ‘creative products’ (Amabile, 1982; Besemer and O’Quin, 1986), or ‘problem-solutions’ (Basadur et al., 2000; Osborn, 1957), or they even loosely alternate between ‘idea’, ‘concept’, and an ‘early product description’ (Florén and Frishammar, 2012; Kudrowitz and Wallace, 2013). This creates problems managing idea screening activities, since the specific definitions of what constitutes an idea for innovation are not consistent.

Furthermore, in contrast to Dean et al. (2006), a vast body of research underlines the importance of an idea being innovative and requiring the presence of novelty (which acts as a quality criterion) (Diehl and Stroebe, 1987; Magnusson, 2009; Rogers, 1995; Runco and Jaeger, 2012). Usually, the degree of novelty is what determines whether an idea is radical or incremental (Balachandra and Friar, 1997; Magnusson, 2009). Radical ideas embody clear departures from existing practice (outside of the existing market) and also represent fundamental changes in technology (e.g. the introduction of streaming services instead of movie rental stores), while incremental ideas constitute minor improvements or simple adjustments to current technology, within an existing market (e.g. improving the battery power of a drilling machine) (Dewar and Dutton, 1986; Balachandra and Friar, 1997).

Ideas that are understood to be problem solutions can also be viewed as consisting of independent components. This means that different solutions can be generated for an existing problem, or that ideas can reframe the initial problem and evolve it into an entirely different type of solution (Dorst, 2011). The study of Dorst and Cross (2001) showed that, if an idea strays away from the initial problem definition, it can be perceived as more original. However, there is a risk that, if an idea becomes further detached from the scope of the organization, the implementation of such an original idea could be deemed unfeasible by that particular organization (Barczak et al., 2009; Holmén et al., 2007; Magnusson, 2009).

Despite these differences in definitions, most studies agree that an idea for innovation acts as an object, whose role is to determine and describe a direction in which to improve a product or a process by reconfiguring existing resources, so that a

useful, feasible, and a more or less original suggestion can be formulated (Cooper, 2014; Dean et al., 2006; Diehl and Stroebe, 1987; Tidd et al., 2005). For further clarity, a short summary of various conceptualizations of an idea is presented in Table 1.

Table 1. Conceptualizations of an idea for innovation.

Conceptualization of an idea	References
Explicit description of a problem solution.	(Dean et al., 2006; Riedl et al., 2011)
Embryo for a product. Envisioned solution for a problem.	(Hatchuel and Weil, 2009; Kahn et al., 2013)
Description of a problem-solution.	(Basadur et al., 2000; Diehl and Stroebe, 1987; Dorst and Cross, 2001; Magnusson, 2009; Osborn, 1957)
Creative product/concept/early product.	(Amabile, 1982; Onarheim and Christensen, 2012; O'Quinn and Besemer, 1999)

The understanding of what makes an idea good, i.e. have high quality, has also differed across different studies. Some studies use criteria to establish the overall evaluation that the idea is good (i.e. the idea performs well under given criteria) (Kudrowitz and Wallace, 2013; Magnusson, 2009), while some studies rely more on the holistic impression that the idea gives (Amabile, 1982; Onarheim and Christensen, 2012). According to Magnusson et al. (2014), the evaluator's holistic impression can to some extent be described using the idea's feasibility, originality and use value, and the different combinations of these criteria can characterise an idea as either being good as a radical idea (high originality, use value and low feasibility), or good as an incremental idea (high feasibility and use value, but low originality) (Magnusson, 2009). Furthermore, Hammedi et al. (2011) found that when the evaluators are reflexive (exert the stop-and-think behaviour), and develop different types of criteria during evaluation, idea screening is made more efficient and effective. Thus, given that the criteria (and their weighting) can change in different situations, the concept of a 'a high-quality idea' in this study will primarily be referred to as a positive holistic impression by the evaluator that the idea is good.

In light of the technical decision-making perspective, an idea can be viewed as an object describing how a certain problem can be solved, however, the boundaries of this object have not been made explicit by extant research. Since idea quality is determined by the evaluators, the following section is focused on outlining role of the evaluators in idea screening, and the characteristics of the evaluators that have been suggested to influence their evaluation process.

2.4 Characteristics of the evaluator

Multiple studies have emphasised that the evaluator's personal characteristics may impact the way in which he/she processes information (Gregan-Paxton and Roedder John, 1997; Gregan-Paxton et al., 2002), thus influencing decisions to adopt or reject ideas during screening (Rogers, 1995). For example, in 2007, Steve Ballmer (then-CEO of Microsoft) made a prediction that the Apple's new phone would fail due to its lacking the right technical specifications (Thompson, 2014). This in itself failed as a prediction, acting as an indication that even experts could be blinded by their own expertise. Evaluator's characteristics that influence judgements have mainly been assigned to domain knowledge (e.g. expertise) and creativity (e.g. openness and innovativeness) (Eling and Herstatt, 2017). Studies have further suggested that there is a trade-off between great domain knowledge versus being open-minded and cognitively flexible (Dane, 2010; Moreau et al., 2001), and that an extensive knowledge base (i.e. that of an individual, team or organization) may lead to negative attitudes towards new ideas (Antons and Piller, 2015; Moreau et al., 2001). Thus, research so far has mainly been oriented towards resolving these trade-offs while continuing the tradition of applying the domain knowledge perspective (e.g. Denker, 2018; Magnusson et al., 2016).

The previous literature has highlighted the fact that there are two types of knowledge domains that are important antecedents to successful innovation. These are knowledge of the user's needs, i.e. the use(r) knowledge domain, and knowledge of the technology that can resolve these needs, i.e. technology knowledge domain (Magnusson, 2009; von Hippel, 1994; von Hippel, 1998). Use knowledge is defined as the ability to comprehend the user's needs and desires, as well as the ability to discern the potential value/benefit to the user (Luthje and Herstatt, 2004; Magnusson, 2009). While technology knowledge is defined as expertise and awareness of the technical capabilities of the producer along with the producer's strategic intentions (Magnusson, 2009).

On the one hand, use knowledge can be understood as the knowledge of the 'problem' that the idea addresses (Denker, 2018; Magnusson, 2009), and relating to accuracy in understanding the user's hierarchy of needs (Homburg et al., 2009). During idea screening, the evaluators need to possess use knowledge in order to understand the benefits that the idea will bring to the user upon implementation (Denker, 2018), as it is considered to be a driver of the idea's future success (Lilien et al., 2002). The user can be understood as the actor who benefits from the idea (Franke et al., 2006), since not all ideas are intended to be commercial offerings, but can also involve the organization or any interested party benefiting from the idea (von Hippel et al., 1999). Technology knowledge, on the other hand, relates to the 'solution' part of the idea, and is needed in order to understand how the idea can be implemented, and as regards whether or not the idea is feasible in the light of the available resources to the producer (Magnusson, 2009). Technology knowledge can

also be understood as a range of competencies that the evaluator has, and is thus enabling him/her to understand the limitations of what is possible to accomplish within a certain domain (Hatchuel and Weil, 2009).

An example of applying use knowledge to idea screening could entail an organization outsourcing idea screening to its potential users, e.g. creating a platform where customers vote on the t-shirt design that they find the most appealing. Here, the collective voice of the crowd is utilized to determine which idea for design would be the most preferable to the users. An example of applying technology knowledge to idea screening could concern the evaluation of technical feasibility of different ideas regarding a space-craft engine and the organization's capability to implement it, by e.g. asking expert engineers at a particular organization to review different alternatives.

Furthermore, previous research has also claimed that including people who possess both use- and technology knowledge (lead users) in idea generation leads to more profitable ideas than relying on traditional market research techniques (Lilien et al., 2002). These findings have led researchers to further examine both the characteristics of lead users and the influence of domain knowledge on idea generation and screening activities (Franke et al., 2006; Luo and Toubia, 2015; Toubia and Florès, 2007). For instance, Magnusson et al. (2016) investigated the influence of domain knowledge by comparing idea screening outcomes (i.e. ratings of idea quality) between technically skilled users, technically naïve users and professional experts. While it was found that the experts (participants with extensive technology knowledge) averagely rated ideas lower than the user groups, experts and users jointly selected the same top ideas. These findings indicate that users can act as proxies for experts when performing idea screening activities, despite their formal lack of technology knowledge.

In spite of the fact that domain knowledge theories have been useful in describing the differences between experts and non-experts, as regards how they screen ideas, and underlying the need of competence of the evaluators (e.g. Gregan-Paxton and Roedder John, 1997; Onarheim and Christensen, 2012), studies have also found that the evaluator's domain knowledge on its own does not explain the differences that exist regarding how he/she perceives idea quality (Denker, 2018; Eling and Herstatt, 2017). Denker (2018), found that an increase in domain knowledge increases the subjective comprehension of ideas, in turn exerting a positive influence on perceived idea quality; however, he was not able to provide any concrete explanations as to why this occurred. Similarly, Magnusson et al. (2016) were not able to explain why naïve users were able to conform with experts when assessing the producibility of ideas, proposing that naïve users potentially possessed latent technology knowledge. These findings suggest that there could be alternative theoretical explanations for the evaluators' behaviour during screening, and that a closer focus

should be put on studying how evaluators reduce uncertainty (Chang et al., 2007) and comprehend ideas (Denker, 2018; Froehlich et al., 2016; Netz, 2018).

In sum, the technical decision-making perspective highlights that, the evaluators act as knowledge entities that can understand what the user wants and needs, and/or what is technologically possible to accomplish. Since during screening the evaluators engage in the evaluation process, it becomes important to understand how this process has been conceptualized and what are the limitations of this conceptualization. The next section provides further detail into how idea evaluation has been studied.

2.5 The process of idea evaluation

The process of evaluating ideas has mainly been portrayed as rational, systematic and analytical, whereby a decision regarding the adoption or rejection of an idea is made (Balachandra and Friar, 1997; Dean et al., 2006; Rogers, 1995; Ronkainen, 1985). During this process, the evaluator is said to use various criteria in order to reflect upon and analyse ideas, so that the potential benefits of the idea, along with its feasibility and originality, can be understood in order to make an informed decision about its quality (Kudrowitz and Wallace, 2013; Magnusson et al., 2014; Rogers, 1995). Thus, high idea quality can be defined from an analytical perspective, as the idea's ability to perform within an explicit frame of reference (Dean et al., 2006).

However, in more recent studies, intuitive decision-making has been described as an alternative way for experts to determine idea quality (Dane and Pratt, 2007; Dayan and Di Benedetto, 2011). Intuition involves a holistic, quick, and associative kind of non-conscious information processing, based on the evaluator's experience and expertise (Dayan and Di Benedetto, 2011; Pretz et al., 2014). The intuitive approach has been found to help the evaluators to deal with complex ideas by relying on the evaluator's own gut feelings (Dane and Pratt, 2007; Eling et al., 2015), and by sorting through large quantities of ideas quickly, while maintaining decision-making accuracy (Eling et al., 2015; Dane and Pratt, 2007; Phillips et al., 2016). A high-quality idea, using an intuitive approach, can thus be understood as a quick, positive and holistic impression where the idea fits within the implicit frame of reference of the evaluator (e.g. Magnusson et al., 2014; Onarheim and Christensen, 2012).

Recently, Hodgkinson and Sadler-Smith (2018) proposed that, during complex decision-making situations, when needing to make strategic decisions, managers cycle between intuitive and analytical thinking (also referred to Type 1 and Type 2 thinking). This notion was supported by Dziallas (2018) in the context of idea screening since she found that experts use a range of criteria to ensure cold calculative cognition, while also frequently relying on intuition, thus revealing a more implicit approach to screening. Provided that intuition and analysis have been identi-

fied as the main processes of idea evaluation (Eling et al., 2015; Magnusson et al., 2014), following are more detailed accounts of how intuition and analysis have been conceptualized in extant research.

2.5.1 Intuitive judgements

Intuitive judgements have been described as instances of knowing, which range from gut feelings and snap decisions to hunches about the future (Pretz et al., 2014). Intuition is often recognised as one of the core processes of the human being that evolved before the ability to reason analytically, hence commonly being related to the concept of *Type 1* thinking (Evans, 2008; Hodgkinson and Sadler-Smith, 2018). Type 1 (or System 1) is the style of thinking in which people process information which is non-conscious, nonverbal, stereotypical, and independent of general intelligence or memory (Evans, 2008). Intuition is also described as a form of complex information processing, within the brain, that is conducted without conscious awareness (Evans, 2008). However, to this day, no studies have agreed on one single definition of intuition, roughly referring to it as ‘affectively charged judgement that arises through rapid holistic association’ (Dane and Pratt, 2007).

In order to clarify the conceptualization of intuition, Pretz et al. (2014) developed measures for distinguishing between three types of intuition: i.e. *holistic intuition*, *inferential intuition*, and *affective intuition* (see Table 2).

Table 2. Typology of intuition, drawn from Pretz et al., (2014).

Intuition types	Definition	Characteristics	Example	References
Holistic intuition	Judgements based on non-analytical integration process of implicit and explicit cues of the environment.	Not limited by the working memory constraints. Highly effective in complex situations that go beyond the analytical capabilities of an individual.	A fireman who enters a burning building may get a sense of danger through smell, sound, and visual impressions and then decide to exit before the roof collapses by absorbing a wide variety of surrounding cues and basing his/her decision on the 'gut feeling'.	(Hammond, 1996)
Inferential intuition	A quick response to previously analytical processes that have become automatic with practice.	The ability to recognise patterns that is depend on the expert knowledge. Effective in situations that require normative responses where there is limited information.	Learning to drive a car requires thorough theoretical and practical engagement; however, over time the process becomes automatic to an experienced driver.	(Phillips et al., 2016)
Affective intuition	Associative emotional responses to a decision-making situation.	Relates to the feelings of certainty regarding a decision, regardless of any explicit and rational support for intuitive belief.	A preference for nostalgic products in a purchasing situation.	(Bechara et al., 2000; Loveland et al., 2010)

Pretz et al. (2014) noted that, while it is possible to distinguish between different types of intuition in a controlled environment, it is difficult in practice to make accurate reports of non-conscious processes (for further detail see Nisbett and Wilson, 1977). Additionally, real life situations can provide mixed intuitive associations, i.e. affective intuition can lead to a negative personal attitude, while inferential intuition can create the directly opposite association (Pretz et al., 2014). Nevertheless, intuitive judgements can still be distinguished from analytical reasoning, and operationalized as holistic and rapid responses based on former knowledge and experience (Morsdorf and Kaltwasser, 1989) and/or emotional associations and beliefs (Evans, 2008; Pretz et al., 2014).

In the idea screening literature, the intuitive approach has mainly concerned the inferential type of intuition (e.g. Dziallas, 2018; Eling et al., 2015; Magnusson et al., 2014; Petervari et al., 2016). Studies have relied on experts with extensive professional experience, postulating that experienced evaluators are more likely to exhibit acts of knowing relevant to the viability of new ideas regarding technological innovations in familiar contexts. Thus, intuition have mainly referred to quick and holistic judgements that the evaluators make during the screening process. Although intuition is explained as non-rational decision-making process of the evaluator (Hodgkinson et al., 2009; Hodgkinson and Sadler-Smith, 2018; Sadler-Smith

and Sparrow, 2008), the desire to apply inferential intuition in idea screening can be understood as a rational approach for the organization, since it allows evaluators to screen ideas with improved speed while maintaining decision accuracy (Dane and Pratt, 2007; Eling et al., 2015). Therefore, consistent with the technical perspective and the desire to optimize idea screening, the usage of intuition in idea screening literature has been mainly understood as the evaluator's ability to recognize patterns, which is dependent on expert knowledge.

2.5.2 Analytical judgements

Analytical judgements can be understood as the conscious process of reflective reasoning (Evans, 2008), where the evaluator applies an evaluation framework (Phillips et al., 2016) to determine how well an idea fits into this framework. Evans (2008) has further explained that analytical reasoning can be attributed to the *Type 2* thinking style. Type 2 (or System 2) thinking concerns conscious, effortful, rule-based, logical, and sequential information processing (Evans, 2008). This means that analytical reasoning is related to the evolving ability to think hypothetically about the future while applying learned domain knowledge in a conscious way. Since it has been described as a process that depends on working memory capacity and general intelligence, Colom et al. (2004) have proposed that analytical capabilities can be enhanced by increasing domain knowledge; further evidence supports this notion (Barret et al., 2004; Epstein, 2003; Evans, 2011). Phillips et al. (2016) have further specified that analytical thinking has greater accuracy when people are facing abstract, generic, and under-developed tasks, while intuition is more accurate in complex but familiar situations.

In order to induce analytical thinking during idea screening, organizations have often introduced explicit criteria for evaluating ideas (Carbonell-Foulquie et al., 2004; Dziallas, 2018). It has also been noted that evaluators can create their own stereotypes as defence mechanisms for dealing with complex and uncertain situations (Van de Ven, 1986), and applying subjective criteria (Filley et al., 1976). This means that, even in the absence of clear criteria for idea screening, some people may be more analytical than others. For instance, Hammedi et al. (2011) found that, when the evaluators had flexibly interpreted and applied the evaluation criteria, this led to a more effective and efficient evaluation process. Thus, a deeper contextual understanding and knowledge of the idea, and experience of the task, have been shown to improve analytical thinking and help to reduce the complexity and uncertainty of idea screening (Dean et al., 2006).

Given these theoretical insights, it is clear that extant research has mainly focused on describing evaluation in terms of intuition or analysis, with an emphasis on how evaluators process information, rather than trying to understand what other activities occur during idea evaluation. Based on this orientation a theoretical framework of the technical decision-making has been further outlined in the following section.

2.6 Theoretical framework

The aim of the theoretical framework is to provide an overview of the technical decision-making perspective popularly used in the idea screening literature, and to indicate opportunities for further research regarding: the *idea*, the *evaluator*, and the *evaluation process* (see Table 3). This framework acts as a starting point for carrying out a closer investigation of idea screening.

Table 3. A framework of the technical decision-making perspective used in idea screening.

Elements of idea screening	Main assumptions	Key references	Research opportunities
The idea	Ideas are units of information (objects) describing a problem solution for a new product or process.	(Kahn et al., 2013; Riedl et al., 2011)	Lack of a consistent (and more encompassing) definition of an idea during the innovation process.
The evaluator	The evaluator is mainly addressed as the embodiment of domain knowledge. Domain knowledge takes the form of use(r)- and producer knowledge (what the user needs, and what is possible to accomplish).	(Eling and Herstatt, 2017; Magnusson, 2009; von Hippel, 1994)	Lack of explanations regarding how different individuals with similar domain knowledge evaluate ideas.
The evaluation process	A rational and/or intuitive approach using which the evaluator comes to a conclusion about idea quality.	(Eling et al., 2015; Dziallas, 2018; Hodgkinson and Sadler-Smith, 2018)	The description of the evaluation process neglects activities that can occur outside of idea evaluation. Lack of explanations regarding what happens during idea screening.

Against the backdrop of extant research on idea screening, ideas have been understood as objects that either propose an explicit description of a problem solution (Dean et al., 2006; Riedl et al., 2011) or act as embryos that can be further developed into new products and services (Hatchuel and Weil, 2009; Kahn et al., 2013). While previous studies have agreed on the problem-solving parts of an idea, and that this should contain use value, be feasible, and have a degree of originality, there has not been any agreement regarding how an idea for innovation should commonly be defined. Specifically, the information content of an idea, and its level of clarity to the evaluator, have not been thoroughly discussed; thus, the definition of an idea for innovation has remained implicit. Given this discrepancy in previous studies, and the need to understand what makes an idea good, the opportunity exists

to further clarify the concept of an idea for innovation and to outline its features. Hence, the first research question: *What are the components of an idea for innovation and how do they affect screening?*, is highly relevant.

The evaluator has mostly been treated as a person with the knowledge to understand an idea and determine its quality. However, this view has also created a stream of research claiming that the knowledge of the evaluator can be externalized to other people with similar knowledge (Magnusson, 2009; von Hippel, 1994), or to other methods that mimic the decision as it would have been performed by an expert or a collective (Amabile, 1982; Magnusson et al., 2016; Toubia and Florès, 2007; Trischler et al., 2018). In doing so, the focus of research has veered away from understanding the evaluator as an individual entangled in complex decision making, and headed instead towards an understanding of the evaluator as a replaceable knowledge entity. However, keeping in mind that idea screening can, in some situations, be carried out by a few individuals (e.g. the in-house evaluation of high-tech product ideas), the outcome of screening can heavily be influenced by individual differences among these evaluators. For this reason, the second research question: *How do the evaluator's personal characteristics influence idea screening?*, requires further attention.

The evaluation process that the evaluators engage in when making judgements, has mostly been viewed to consist of different modes of thinking, whether this be intuitive or analytical (Hodgkinson and Sadler-Smith, 2018). However, what happens during this process, and why the evaluators think that ideas are good, has not been extensively researched (Dziallas, 2018). Instead, research studies have focused on prescriptive explanations, in turn focusing on how to improve the quality and performance of idea screening (Eling et al., 2015), rather than on understanding how the evaluators make judgements. By investigating the processes involved in evaluation, and by zooming in on individual idea screening situations, we were able to outline activities that the evaluators engage in during evaluation and understand the role that these activities have in the perception of idea quality (Kihlander and Ritzén, 2012; Rogers, 1995). For this reason, the third research question: *How do evaluators screen ideas for innovation and perceive idea quality?*, has been formulated.

Together, these three research questions contribute to the overall point of expanding our current understanding of idea screening. Furthermore, the theoretical framework (presented in Table 3 on page 26) illustrates the principal assumptions of the technical perspective in the idea screening literature, and outlines opportunities for further research. Despite the benefits that this perspective brings (e.g. methods for improving the efficiency and effectiveness of idea screening), it marks a detachment from the empirical phenomenon of idea screening, paying little attention to what happens when humans interact with ideas (Tidd and Bessant, 2018). In order to address this issue, a closer investigation of idea screening was carried out.

3 Methodology

The aim of this chapter is to explicate a methodology that enables the empirical operationalization of this study. This is preceded by a discussion on the onto-epistemological assumptions, followed by a discussion on the methodological choices and their alignment with the research subject. The final part of this chapter depicts the phases and steps of the research design, concluding with a reflection on methodological validities.

3.1 Paradigmatic stance of the researcher

Throughout the process of this thesis, I have struggled to find a perspective that would help me to understand the different phenomena I have encountered. Reading, thinking about, and seeing ideas that are perceived and interpreted as symbolic entities, but also judged to be right and wrong, good and bad, possible and impossible, has led me to realize that I cannot operate at the extremities of different philosophical standpoints. Neither a postpositivist (Phillips and Burbules, 2000), nor a constructivist (Guba, 1990) perspective alone was able to fully capture my experiences and observations, nor justify my methodological choices.

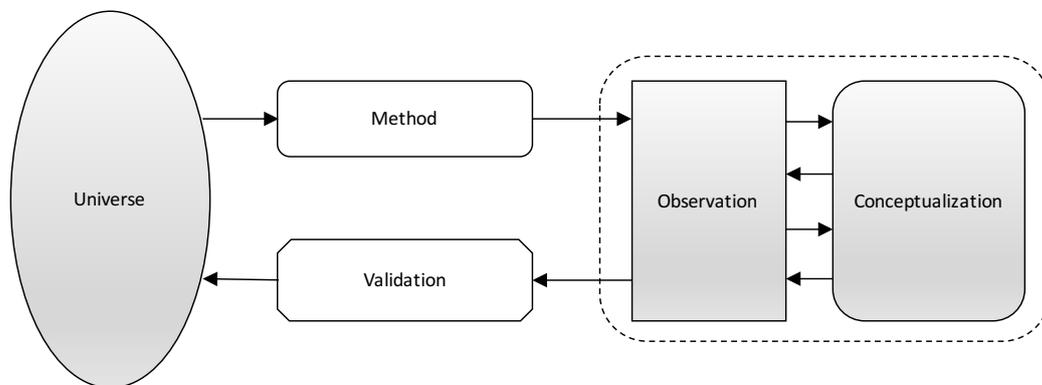
Conceptualizing an idea for innovation became a healthy exercise, providing me with a necessary step in understanding that a more inclusive onto-epistemological position was needed. Consequentially, by following the steps of the research process, my perspective has aligned with that of Critical Realism, which provides an inclusive middle ground, and was used as the guiding philosophical approach in this thesis (Danemark et al., 2002; Guba, 1990).

3.1.1 Critical realism

The essence of Critical Realism is that, even though a real world driven by real natural causes exists, it is impossible for humans to exhaustively perceive it with their limited sensory and intellectual capabilities (Cook and Campbell, 1979; Guba, 1990). In a similar view, Kim (1990) describes the process of scientific discovery as an interplay between the universe and our attempts to observe and understand it, which are limited by our methods and intellectual abilities (see Figure 2). From the realist perspective, the world exists independently of our knowledge and scientific inquiry (Bhaskar, 2008; Sayer, 2011), with facts and data are always being mediated by our theoretical conceptions. From this, stems the notion that the phenomena we are able to observe may be theory-dependent and thus explained, but not theory-determined (Danemark et al., 2002). This means that people's actions are not determined by the factors that we can identify through empirical investigations, but that people's actions are conditioned. For instance, prospect theory leads to the rather straightforward hypothesis that when faced with a risky choice leading to gains people become risk averse, preferring options that lead to a lower than ex-

pected level of utility but a greater level of certainty (Kahneman and Tversky, 1979). However, the reality is more complex, since the risk information available to firms may not correspond to the information used when developing prospect theory; the application of the theory may differ from the level of analysis that it was developed for, with managers' distinctions between risk and uncertainty possibly differing from how the theory has conceptualized it (Bromiley and Rau, 2019). This means that theory may help us to understand a certain relationship, but it does not determine what happens in the real world. Following Danemark et al. (2002), I understand Critical Realism to encompass four main principles: 1) the principle of stratified reality, 2) the mechanism-based perspective, 3) the prevalence of multiple simultaneous mechanisms, and 4) the generativity of events.

Figure 2. The process of scientific discovery (adopted from Kim, 1990, pp.88-92).



The principle of stratified reality (Bhaskar, 2008) suggests that there are three domains of reality: *i*) the real, which is understood to mean the underlying mechanisms leading to the occurrences of the events, *ii*) the actual, which encompasses the events that actually occur but may be beyond our ability to observe, and *iii*) the empirical, which captures the events that can be empirically observed. This conception helps us to understand complex relationships between certain events that can lead to an empirically observable happening, and the domain in which the causal powers, events and experiences take place (Bhaskar, 2008). This is also a way of saying that reality exists independently of our human conceptions of it, and that our senses limit our perception of what is actually occurring (e.g. Plato's allegory of the cave). Critical Realism stresses the notion that the presence of causal links leads up to an occurrence of a phenomenon/event, but denies our capacity to see these links due to our own limited perceptions (Danemark et al., 2002). Hence, the principle of stratified reality proposes the following hierarchy:

The real (mechanisms) →

The actual (events beyond the experience) →

The empirical (experienced event)

Consequently, all theory claiming to explain the occurrence of events is inherently fallible, but not equally fallible (Popper, 1987). Scientific research and technological advancements have allowed us to expand our senses (e.g. the invention of the telescope to extend our sight), in addition to enriching our language with new conceptions that allow us to understand and express complex phenomena. Thus, this expansion of our conceptual thinking has enabled us to have a more nuanced understanding of reality. Over the past century, social science research methods have also developed, allowing us to obtain data from multiple perspectives (circumventing single sensorial or intellectual data sources) and to better investigate causal inferences (Guba, 1990; Shadish, 2010). These methodological interventions have better equipped researchers to capture the underlying mechanisms leading to the empirically-observed phenomena.

The mechanism-based perspective posits that events do not occur at random; instead, there are multiple conditions that need to be fulfilled in order to produce a specific outcome/event (Danemark et al., 2002; Sihvonen and Pajunen, 2019). A mechanism can therefore be defined as a process that is triggered into action and then produces outcomes, whereby the occurrence of an outcome is what completes this process (Hedström and Wennberg, 2017; Pajunen, 2008). The conditions that constitute a mechanism can take the form of both social and natural phenomena; they can also be understood as objects, i.e. entities, activities or even structures, that interact with each other (Pajunen, 2008). They also condition an actor to take certain actions that lead to an outcome (Hedström et al., 1998). This means that objects constituting a mechanism can possess causal powers, and can also exert some influence over other objects. Therefore, one should not ascribe realness to an entity based on the entity's materiality, but rather on the effects it creates (Aspara et al., 2013).

The mechanism-based perspective essentially describes a piece of theory that should explain the component process of a larger system (Stinchcombe, 1991). Mechanisms interact in complex open systems (Sihvonen and Pajunen, 2019), and we cannot isolate interacting mechanisms (Bhaskar, 2008). However, it is easier for us to understand the complex empirical reality by abstracting to the level where the main conditions of the mechanisms can be clearly outlined (Danemark et al., 2002). This means that Critical Realism is primarily focused on mid-range theoretical explanations leading up to the empirically-observable outcomes.

The prevalence of multiple simultaneous mechanisms suggests that there could be different paths (different mechanisms) that lead to the same outcome (Sihvonen and Pajunen, 2019). Mechanisms are made up of different conditions, and these conditions can interact with each other in a variety of ways while still leading to the occurrence of the same event. It is also possible for different mechanisms to interact with each other but to have opposing causal powers, cancelling each other out

yet still existing beyond the realm of the empirical observation (Danemark et al., 2002).

Generativity is another way of saying that events can trigger the creation of new events. According to Devitt (2006), every new event that occurs becomes an actual feature of the real world, consequentially becoming a part of a mechanism leading to the creation of new outcomes (Danemark et al., 2002). For instance, society is made up of thinking and reflective human beings, who are affected by certain mechanisms, who are conditioned by them, but who are also capable of changing the social reality through their actions. Based on this principle, human actors' thoughts, actions, past experiences, ability to recollect these experiences, or the existence of particular social norms, in themselves the products of certain mechanisms, also become conditions for the appraisal of new mechanisms.

These principles of Critical Realism imply that theories aimed at explaining certain phenomena should stem from empirical data (Hedström et al., 1998), and pursue generalizability to formulate better theories that can explain the occurrence of a particular outcome (Danemark et al., 2002; Guba, 1990). Despite the fact that there is no specific methodological approach to Critical Realism, Critical Realism does signify the importance of methodology, and the ability to study complex relationships between various conditions that lead to outcomes. For Critical Realists, theory and method are strongly interlinked and need to agree with the above-mentioned principles in order to produce reasonable theoretical explanations that improve our existing knowledge (Danemark et al., 2002).

From the perspective of Critical Realism, idea screening can be understood as a complex process whereby the perception of idea quality is the outcome of multiple conditions that interact with each other in the form of a mechanism. For instance, difficulty understanding an idea may be a condition that reduces the perception of that idea's quality, but the perception of idea quality may also depend on intuition and analysis, which may both interact with each other, leading to a final decision about the idea quality. In order to outline the conditions potentially influencing judgement, it is thus important to obtain a profound description using the qualitative methodological approach, and to establish empirical regularity of the theoretical explanation using a quantitative approach. Hence, a multiple, or a mixed, methodology is an appropriate way of conducting research into a multifaceted phenomenon from the Critical Realist perspective.

3.2 Methodological approaches

Multiple research approaches were incorporated into this thesis in order to obtain a better understanding of idea screening, along with the need to outline the conditions influencing the evaluator's perception of idea quality. The investigation iterated between deductive and inductive logics during different stages of the research process, in addition to employing quantitative, qualitative and mixed methods ap-

proaches. A list of the strengths and weaknesses associated with each approach is given in Table 4, which is followed by a brief explanation of each of the methodological approaches used in this thesis.

Table 4. Strengths and weaknesses of methodological approaches (adapted from Johnson and Onwuegbuzie, 2004).

	Quantitative Research	Qualitative Research	Mixed-Methods Research
Strengths	<ul style="list-style-type: none"> • Testing and validating existing theories. • Generalizable research findings. • Possible to construct a situation that isolates specific variables. • Provides precise numerical data. • Effect size, statistical significance is independent of the researcher. • Useful for studying large numbers of people. 	<ul style="list-style-type: none"> • Data is based on the participants' own categories of meaning. • Useful for studying cases in-depth. • Provides an "emic" or insider point of view. • Possible to identify contextual factors in relation to the phenomenon of interest. • Possible to study dynamic processes (sequential patterns and change). • Cases can provide a vivid demonstration of the phenomenon. 	<ul style="list-style-type: none"> • Narratives can be added to numerical data. • Numbers can be used to add precision to words. • Provides qualitative and quantitative strengths. • Researcher can generate and test theory. • Not confined to a single method or approach. • Can answer a broad range of research questions. • Strengths of one method can be used to overcome the weaknesses of another method. • Provides stronger evidence for conclusion through the convergence and corroboration of findings. • Produces more complete knowledge necessary to inform theory and practice.
Weaknesses	<ul style="list-style-type: none"> • The researcher's categories may not reflect the local constituencies' understanding. • The researcher may miss out on phenomena occurring beyond the scope of theory. • Knowledge produced may be too abstract and general for direct application to local situations. 	<ul style="list-style-type: none"> • Knowledge produced may not be generalizable to other settings. • Difficult to test hypotheses and theories. • Time-consuming data collection and analysis. • The findings are more easily influenced by the researcher's personal idiosyncrasies. 	<ul style="list-style-type: none"> • Difficult for a single researcher to use both qualitative and quantitative approaches. • Methodological purists contend that you should stay within either a qualitative or a quantitative paradigm. • May exhibit problems of paradigm mixing, e.g. how to qualitatively analyse quantitative data, how to interpret conflicting findings.

3.2.1 Quantitative research

The characteristics of traditional quantitative research is mainly focused on deduction, confirmation, theory and hypotheses testing, standardized data collection and

statistical analysis (Bonoma, 1985; Johnson and Onwuegbuzie, 2004). The main driver of quantitative research is obtaining an unbiased view of different relationships, entailing that researchers following this approach should refrain from their own feelings, personal values and opinions when studying a phenomenon, and instead focus on the empirical evidence (Danemark et al., 2002). According to Morse and Niehaus (2009), quantitative research is central to forming generalizable knowledge of the phenomena, something which is in line with the principle of Critical Realism, that theory should be generalizable. However, the main trade-off when using the quantitative approach is that it can be closely tied to empiricism (reality is what is being observed), and be unable to build theory or fail to provide in-depth understanding of the occurrences due to its pursuit of abstract generalization (Danemark et al., 2002; Johnson and Onwuegbuzie, 2004). Hence, the quantitative approach is useful when a Critical Realist tests the empirical regularity of the phenomenon; however, it is insufficient for expanding our understanding of complex phenomena, particularly due to not being able to explain how the phenomena occur, for whom, and under what circumstances on the individual level (Johnson and Schoonenboom, 2016).

Specifically during this thesis project, the quantitative approach was used in Study 2, relying on statistical analysis³. It followed the deductive logic and employed partial least square structural equation modelling (PLS-SEM) (Hair et al., 2012; Hair Jr et al., 2016), which tested the relationships between the key conditions that were hypothesised as influencing perceptions of idea quality. The purpose of Study 2 was to examine whether or not the central phenomenon of subjective comprehension had a general influence on idea screening activities, establishing the relevance of the phenomenon (see Study 2 for further details).

3.2.2 Qualitative research

The qualitative research approach mainly follows the inductive or abductive logic (Dubois and Gadde, 2014), and is not based on a unified theory or a methodology (Flick, 2008). It can adopt various stances and methods of data collection that capture an in-depth description and interpretation of the empirical phenomenon (Gray, 2016). The qualitative methodology is often connected with a subjectivist/constructivist view, whereby reality is what people perceive it to be, and truth and meaning does not exist outside of human consciousness (Guba, 1990). The main benefit of using qualitative methods is that they allow researchers to construct theory around a phenomenon, also being able to provide with a profound understanding from the insider point of view (Gray, 2016). This aligns with the Critical

³ The deductive quantitative approach was also employed in Study 3, but it followed algebraic analysis rather than the statistical analysis of data.

Realist idea that complex mechanisms may condition human action and that subjectively-constructed meaning may be as real in its influence as materialized entities (Bhaskar, 2008). However, the limitation of the qualitative approach is its lack of generalizability due to its focus on the local context, difficulty to test assumptions, and that it may be influenced by the researcher's own personal values⁴ (see, for example, Rouch et al., 2010).

In this thesis, a qualitative research approach was applied to Study 4, whereby grounded theoretical techniques (Gioia et al., 2013; Strauss and Corbin, 1990) were used to trace the activities that evaluators conduct while screening ideas. This was achieved by means of open line-by-line coding of the empirically-observed activities that were combined into first order codes and then, upon further abstraction, into second-order activity categories. This procedure allowed the identification of key activities (conditions) occurring during idea screening, and helped in forming an in-depth understanding of the idea screening process (see Study 4 for further details).

3.2.3 Mixed Methods Research

Mixed methods research (subsequently MMR) is an approach whereby the researchers combine qualitative and quantitative methods into a single research study, or a set of research studies (Johnson et al., 2007). MMR is based on the notion that multiple methodological paradigms can be useful to scientific research and practice, which is also in line with the main principles of Critical Realism (Johnson, 2017). MMR is considered to be the “third methodological paradigm”, following the emergence of the quantitative and then the qualitative methodology in social science (Johnson and Onwuegbuzie, 2004; Teddlie and Tashakkori, 2003). The purpose of MMR is to increase the trustworthiness of research by having a more developed methodological toolbox. MMR is specifically well equipped to address complex phenomena, by means of obtaining insights into phenomena using qualitative methods, but also by means of accounting for the regularity and relevance of the main influencing conditions using quantitative methods (Johnson and Schoonenboom, 2016).

In order to successfully conduct an MMR study, you need to be aware of the strengths and limitations of each research approach (Bazeley, 2012; Johnson and Onwuegbuzie, 2004); for that reason, an analysis of the methodological strengths and weaknesses was performed (see Table 4 on page 32). MMR combines the strengths and reduces the weaknesses of quantitative and qualitative approaches by

⁴ In regard to axiology (philosophical study of value), despite that quantitative approach claims to be value free, it does intrinsically value precision and correctness. While qualitative research is more explicit with its research positioning and objectives.

informing the researcher using different perspectives, while accounting for the perspective's limitations (Onwuegbuzie and Johnson, 2006). MMR emphasises the careful development of a research design using abductive reasoning, zooming out of individual studies, cross-validating findings through methodological triangulation (Jick, 1979), and converging the results on specific points of integration (Johnson and Onwuegbuzie, 2004). Common approaches used in MMR involve qualitizing quantitative data by means of, for example, complementing survey data with additional interviews and integrating them into the study (Buck et al., 2009); or quantitizing qualitative data by means of, for example, eliciting the participants' perceptions into codes, developing an intervention, and then testing the efficacy of that intervention (Chilisa and Tsheko, 2014). Mixing methodological approaches allows producing insights that go beyond the sum of the individual studies (Bazeley, 2012).

In this thesis, the use of MMR was twofold: First, an MMR approach was applied to the individual studies (Study 3 and Study 4), by integrating qualitative and quantitative accounts in order to build an understanding of the mechanisms that influence perception of idea quality. Second, an MMR approach was integrated into this thesis by corroborating the findings from four individual studies in order to obtain a broader and deeper understanding of the activities pertinent to idea screening.

Both Studies 3 and 4 used 'inherently mixed' approaches (Bazeley, 2012). This term applies to studies in which the same data source is able to provide both qualitative and quantitative information. This was achieved by applying the qualitative comparative analysis (QCA) (Ragin, 2000), in order to analyse quantitative (Study 3) and qualitative (Study 4) data sources. The QCA is a case-based approach that provides a way of studying relationships between conditions (Rihoux and Ragin, 2008). This approach follows the principles of Boolean algebra, and makes it possible to identify which different configurations of conditions lead to outcomes (Ragin, 2000). Hence, if the key conditions are identified in data, and the outcome variable is made clear, then QCA will help in finding the necessary and sufficient conditions able to produce the outcome. In addition, QCA adapts the mechanism principle of Critical Realism (configurations of conditions lead to an outcome), allows the study of complex relationships (outcomes rarely have a single cause), accounts for equifinality (there may be multiple paths to an outcome), and addresses causal asymmetry (a condition may be causally related in one configuration but unrelated in another) (Misangyi et al., 2017; Sihvonen and Pajunen, 2019).

Furthermore, the use of MMR in this thesis allowed me to compare and contrast the findings from the individual appended studies and to build a more refined theoretical understanding of the processes involved in idea screening. This was accomplished by dividing the research design into several phases, identifying the key conditions in each individual study, and building an integrative framework around

the key conditions. This approach allowed me to include qualitative and quantitative inputs and to provide a broader and deeper explanation of idea screening.

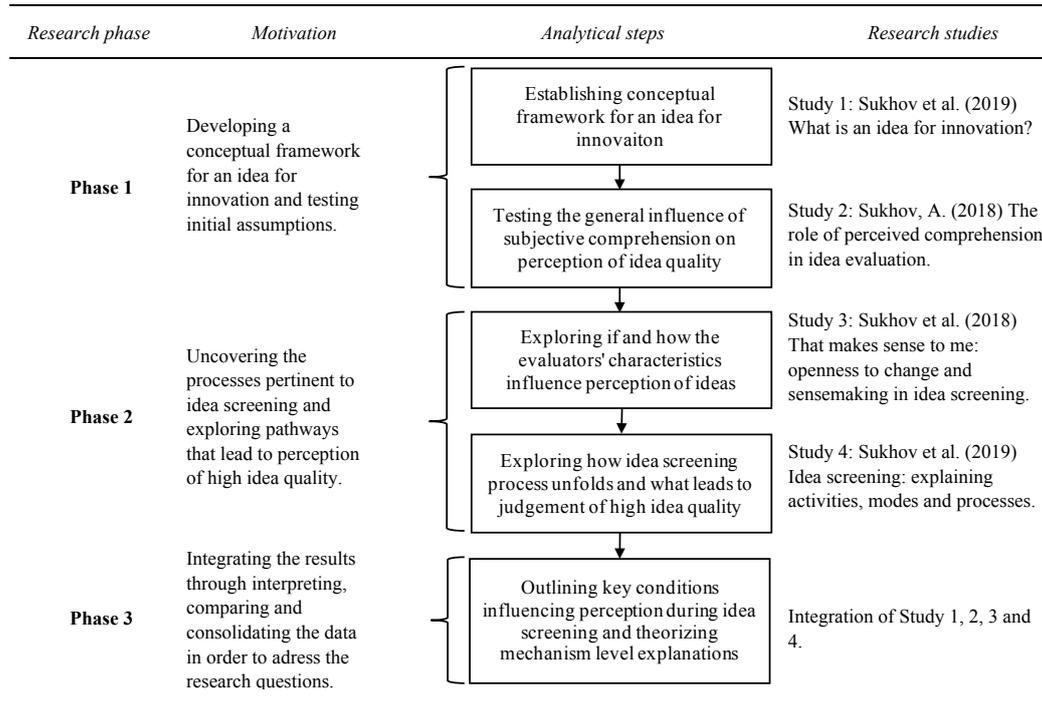
3.3 Research design

In order to clarify the concept of an idea for innovation, to understand the characteristics of the evaluator, and to outline the processes of idea evaluation, a mixed-methods design was used. This design was considered to be appropriate for the following three reasons: First, the phenomenon being investigated (idea screening) is complex (Hammedi et al., 2011). For instance, evaluators are faced with a situation whereby they need to make strategic decisions regarding ill-defined and underdeveloped ideas for innovation (Dziallas, 2018; Hammedi et al., 2011; Van de Ven, 1986). Second, as Teddlie and Tashakkori (2003) suggest, mixed methods research has the major advantage of simultaneously verifying and generating theory during the study. This notion led to a multi-phase research structure where theoretical assumptions, across various studies, could be compared and adjusted based on the findings. Third, when the findings from different methods converge, the inferences made in this thesis can be stronger, thus improving its trustworthiness (Johnson and Onwuegbuzie, 2004). For this reason, a sequential order was used, whereby the researcher's understanding of the phenomenon was enhanced on the basis of the empirical evidence, while opportunities for reflection between the individual studies guided the next steps of the investigation (Ragin and Becker, 1992).

3.3.1 Research phases and analytical steps

This thesis employed an emergent sequential research design, which followed the logic of iteration between: *i*) building a conceptual framework, *ii*) testing assumptions, and *iii*) refining the focus on the basis of the new findings (Schoonenboom and Johnson, 2017). This meant that the theoretical conceptions used during each individual study were prone to changing on the basis of both the progression and a deeper understanding of the phenomenon. This progression stopped when a non-contradictory and satisfactory explanation was achieved for the main conditions involved in idea screening. The steps and phases during which this research was conducted are illustrated in Figure 3.

Figure 3. Research design of this thesis.



Phase one focused on outlining the concept of an idea for innovation, testing its influence on the idea evaluation process and the perceived idea quality. Phase two aimed to form an in-depth understanding of idea screening from the perspective of the evaluators, and uncovering configurations of conditions that influence the idea evaluation process and perceptions of idea quality. Phase three involved identifying reoccurring conditions (main themes) during the previous analytical steps, comparing qualitative and quantitative outcomes, and forming integrative statements in relation to the key conditions, as well as building explanations of the mechanisms influencing screening (Schoonenboom and Johnson, 2017).

In summary, each phase of this study consisted of multiple analytical steps. Each of the steps followed the logic of emergent design and contained different methodological and theoretical approaches which progressively built on each other. In order to provide an overview and enable the reader to follow the logic of this emergent design, Table 5 provides a synopsis of the individual studies, together with their respective aims and takeaways.

Table 5. Brief summary of the appended papers.

Appendix	Methodology	Data collection and analysis	Aim	Takeaway
Study 1	Conceptual	N/A	Establish a conceptual framework outlining the components of an idea for innovation.	An idea for innovation is defined as a short contextual narrative consisting of a solution to a certain problem. Ideas have a dual purpose: 1) provide a complete and understandable description for a plan of action, and 2) trigger new associations that give rise to new ideas.
Study 2	QUAN	Survey using 115 students in the first sample, and 96 members of general public in the second. Data was analysed using PLS-SEM.	Test the influence that idea completeness has on subjective comprehension and perceived quality of early ideas for innovation.	Perceptions of high/low idea quality largely based on evaluators' subjective comprehension of the ideas. Ideas that are better understood are also given a higher quality rating.
Study 3	QUAN	Survey using 20 experts from an IT company. Data was analysed using fuzzy set QCA.	Investigate whether the evaluator's values influence perceptions of idea quality.	The values of openness to change and conservation may guide the way in which evaluators make sense of ideas, and the idea screening activity, thus influencing perceptions of idea quality.
Study 4	QUAL	Think-aloud protocol regarding individual idea screening cases by 14 experts from an IT company and a manufacturing company. Data was first analysed using the Gioia method, and then using fuzzy set QCA.	Explore the idea evaluation process as it unfolds and find combinations of idea evaluation activities leading to perceptions of high idea quality.	During idea screening, evaluators do not only evaluate and select high quality ideas but also give meaning to and improve ideas. Idea screening can take the form of a generative process.

Table 5 shows that the empirical observations documented in this thesis involved multiple and mixed methods of data collection, data analysis, and included several independent samples of participants (in total creating insights from 1,305 individual idea screening cases involving 245 people). The range of these activities allowed the phenomenon of idea screening to be captured in great detail, also helping to identify the overarching patterns that were further examined during phase three.

3.4 Validity of the research design

One of the key principles during MMR is addressing the issue of using different methodological paradigms within a single study. In order to address this, Onwuegbuzie and Johnson (2006) developed an analytical framework which can be used to legitimize research strategies and account for the limitations of the MMR design. This framework helps researchers to achieve consistency, perform methodological triangulation, form a broader understanding of the phenomenon, and increase awareness of their limitations. A full account of the validity dimensions is presented in Table 6.

Table 6. Analysis of validity for mixed methods research.

Validity dimension	Definition	Legitimation
Emic-etic	The extent to which the research accurately understands, uses and presents the participants' subjective insider views and the researcher's outsider (observer) view.	Triangulation between different methods of data collection and analysis, e.g. Study 2 presents a descriptive account of idea screening, while Study 4 provides an insider perspective.
Paradigmatic	The degree to which the researcher clearly explains his or her philosophical beliefs about research.	Explanation of the Critical Realist worldview, and the paradigmatic stances of the research methodology.
Commensurability	The degree to which a researcher can make gestalt switches between the lenses of qualitative and quantitative research and integrate these views into a third viewpoint.	Multiple research studies (phases) involving the support of other researchers skilled in quantitative and qualitative research approaches.
Weakness minimization	The extent to which the weakness of one research method is compensated for by the strengths of another method.	Methodological triangulation between the key conditions and research questions regarding idea screening. Integration statements during Phase 3.
Sequence of activities	The degree to which research appropriately addresses the findings from earlier qualitative and quantitative phases.	Emergent sequential research design where studies build on each other on the basis of new assumptions.
Conversion	The accuracy of data the transformations and appropriate interpretations made of the transformed data.	Iteration between theoretical explanations and empirical observations within and between individual studies. Independent studies and samples showing similar findings.
Sample integration	The degree to which a researcher arrives at appropriate conclusions and generalizations from the mixed samples.	Tests and observations from multiple independent samples within the context of idea screening showing the influence of similar conditions, e.g. Study 2 shows similar effects between two samples while Study 3 shows similar effects in a different context.
Data integration	The degree to which the researcher has achieved integration of the data, analysis, and conclusions.	Integration statements on the key reoccurring conditions influencing idea screening, and integration statements regarding the research questions of Phase 3. Non-reoccurring conditions were not emphasized.
Pragmatic	The extent to which the research purpose was met.	The research questions could be answered by using a mixed method research design.
Socio-political	The degree to which the researcher addresses the interests, values and viewpoints of multiple stakeholders during the research process.	Identification of limitations between theoretical frameworks explaining the idea screening process. Extension of the theoretical perspective to account for limitations. Minimal personal desire for specific results, the open and explorative aim of the studies.
Multiple-validities	The extent to which all of the pertinent validities are successfully addressed and resolved.	Explicit analysis of multiple validities.

From Table 6, it follows that the research design of this thesis has addressed key methodological tensions and provided explicit accounts of legitimation with regard to the eleven dimensions of validity that have been outlined in MMR (Johnson and Schoonenboom, 2016; Schoonenboom and Johnson, 2017). In addition, each appended study provides a detailed account of the theoretical and methodological assumptions, operationalization, and the findings.

4 Findings

This chapter provides a step-by-step description of the empirical findings, during three phases. Phase one describes the initial empirical investigation, aimed at clarifying what factors influence idea screening. Phase two describes an in-depth analysis of the activities that occur during idea screening. Phase three integrates the overall findings and builds explanations for the evaluator's activities during idea screening.

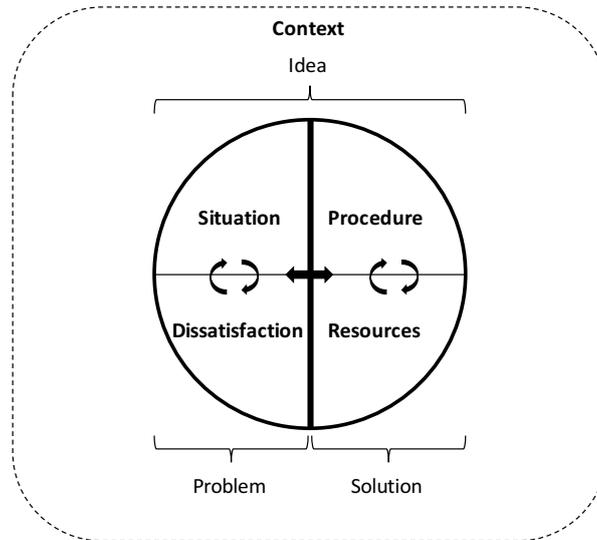
4.1 Phase 1: Clarifying the idea screening phenomenon

During this phase, two studies were carried out. Study 1 was a conceptual paper aimed at outlining the components and characteristics of an idea for innovation. Study 2 was aimed at testing whether this conceptualization of an idea had a direct influence on the perceptions of idea quality, and whether it was relevant to the general context of idea screening. As such, phase one helped to clarify the phenomenon of idea screening and help me to orient myself in the research field, on the basis of the empirical observations. Following, is a summary of the studies that were conducted during this phase.

4.1.1 Step 1: Conceptualizing an idea for innovation

In the NPD literature, an idea is often referred to as a description of a future product and consists of two parts, i.e. a user-related problem and a solution to this problem, which is new and useful (Basadur et al., 2000; Dean et al., 2006; Florén and Frishammar, 2012; Froehlich et al., 2016; Magnusson, 2009; Osborn, 1957). However, despite a substantial body of research, the conceptualization of an idea is seldom elaborated upon (Dean et al., 2006; Florén and Frishammar, 2012). In order to account for this, and clarify the components of an idea for innovation, I developed the following conceptual model (see Figure 4).

Figure 4. A model of an idea for innovation (adapted from Sukhov et al. 2019).



In this model, the problem and solution parts of an idea for innovation can be further divided up into subcomponents. According to Smith (1988), a ‘problem’ can be defined as:

“the disharmony between reality and a person’s preferences for the reality”
(Smith, 1988: 1491).

Therefore, a ‘problem’ consists of two elements: First, it addresses a certain *situation*, i.e. identifies what is happening and, second, it indicates someone’s *dissatisfaction/preferences* with regard to that situation, i.e. clarifies why the situation needs to change. For instance, in a study by Magnusson et al. (2016) one of the ideas that were submitted for idea screening proposed an application for mobile telephony:

“When you are riding the train, sub-way or waiting for a flight, you daydream, sleep or simply not pay attention on where you are. It would be good if a mobile phone could receive a silent SMS; that activates your alarm or puts a direct reminder from e-mail/organizer. A possibility to solve this could be use of NFC (near field communication) that tags the station you would like to get off at, and sets of the alarm automatically.”

In this example, the problem relates to the commuter missing his/her stop. The solution is to have a mobile phone automatically sound an alarm to alert the commuter to his/her approaching stop. The idea describes a specific situation by providing the following background; feeling tired, riding on a train, and needing to get off at a certain stop, while the dissatisfaction felt is explained by the event of missing this stop due to a lack of awareness. In this example, the problem description contains both: the situation and someone’s dissatisfaction. Together, these components help to clarify a user-related need in the context of public transportation and mobile devices.

The ‘solution’ part can also be viewed as a construct of two elements. The solution often describes a *procedure* for how a problem can be resolved, i.e. explains how the solution could work and finally identifies the key *resources* required for its implementation, that is it recognizes what and/or whom is needed for the procedure to work (Smith, 1988; Suh, 2001). In relation to the previous example, the solution relates to the technological capabilities of the mobile phone through the development of a new function. The procedure that is suggested is that the phone automatically tagging the station and sending a signal to the commuter, while the resources that are required involve a program that would automatically process information received from a Near Field Communication device built into the mobile phone.

In addition to these components, it is also important to emphasize that ideas do not exist in a vacuum. Ideas are characterised as products of people’s creative thoughts within a particular context (Amabile, 1983; Froehlich et al., 2016). The context in which ideas are conceived and evaluated may also carry implicit understandings of the social and cultural environment (Liu et al., 2014; Tanggaard, 2012), personal and organizational values and attitudes (Antons and Piller, 2015), and peoples past experiences (Berryman, 2008; Deichmann and Ende, 2013). Contextual understanding and knowledge may thus influence the idea creator’s ability to generate original (new to the context) and appropriate (suitable in the circumstances) ideas (Kristensson and Magnusson, 2010), but may also influence the person’s ability to understand, recognize and evaluate ideas (Berryman, 2008). Therefore, the context influences the evaluator’s interpretation, but can remain implicit. In the example above, the context in which the idea was conceived was a major Swedish mobile telephony company whose employees were asked to come up with ideas that could outline future innovation projects at the company (Magnusson et al., 2016). Thus, the context of mobile telephony and its technological application constituted the implicit environment for which ideas were developed.

Based on these components, an idea for innovation has a dual role: First, it aims to communicate a certain course of action in relation to the situation, and specifies how to resolve an identified problem. In order to do so, an idea needs to provide a description containing the necessary information, outlining a problem solution in a form of an understandable narrative (Froehlich et al., 2016). Second, an idea can trigger new associations in the person to whom the idea is being communicated, since, for example, the evaluator might not be aware of the context, and might interpret the idea in a different way than it was intended (Yus, 1999). Thus, the concept of an idea for innovation can be summarized thus:

“A description of a situation in a specific context that is deemed unsatisfactory by an actor who explains how this situation could be improved by applying appropriate resources.” - Sukhov et al. (2019: 40), Study 1.

Importantly, an idea’s potential is highly dependent on the evaluator’s interpretation, since the explicit information contained in the idea’s description may not be

as vital as the ability of the evaluator to understand what the idea refers to. Therefore, an idea should not be viewed as a technical description of various elements, but as a narrative which is communicated to the evaluator upon interacting with an idea.

4.1.2 Step 2: Testing initial assumptions

At this stage, there was a need to follow up Study 1 and to test whether the conceptual model of an idea for innovation could influence both the idea screening process and the perceived idea quality. Based on the conceptual model, ideas act as narratives rather than technical descriptions. This means that, if the ideas were actually treated as narratives by the evaluators, then these evaluators' ability to comprehend the idea would mediate the perception of an idea's quality, and play a significant role. However, the actual relationships between the idea's degree of information content (completeness), the evaluator's comprehension of the idea, and his/her perception of idea quality, were not clear at that point.

The first hypothesis driving Study 2, which was based on the technical perspective of idea screening, was that a lower level of information content in the idea description (idea completeness) would lead to a lower perception of idea quality when comparing two similar ideas. This was based on the literature suggesting that idea evaluation is an informed decision process whereby a lack of components explaining the who, what, where, when, why and how, would result in an incomplete description and thus lead to a perception of lower idea quality (Dean et al., 2006). Idea quality was measured as a holistic perception of how good the idea was, together with separate criteria regarding originality, use value and feasibility (Kudrowitz and Wallace, 2013; Magnusson et al., 2014). In addition, a measure of subjective comprehension of the idea was also included as a mediating variable between completeness and idea quality. This was based on the literature suggesting that a lack of information in the idea description could stimulate additional cognitive processing, hindering fluency (impeding the ease of understanding of the idea's narrative) and thus leading to the perception of low idea quality (Schwarz, 2004; Yus, 1999). Therefore, hypothesis 2 proposed that low completeness would result in low comprehension of an idea, and hypothesis 3 suggested that low comprehension would also reduce perception of ideas' quality. The following hypotheses, guiding Study 2, were constructed:

Hypothesis 1. A decrease in an idea's completeness decreases the assessors' perceived quality of that idea.

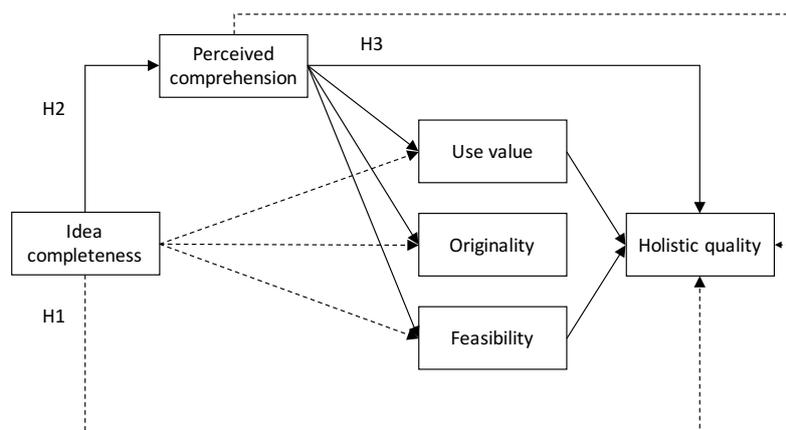
Hypothesis 2. A decrease in an idea's completeness decreases its perceived comprehension.

Hypothesis 3. A decrease in the assessors' comprehension of an idea decreases its overall perceived quality.

In order to account for the external and internal validity of the findings, an experimental approach, using two independent samples, was employed (Bonoma, 1985). The first sample was a lab experiment, where students ($n=115$) were asked to rate ideas with varied levels of completeness. This setup allowed isolation of the effects of completeness on comprehension and perceived idea quality, since these ideas could be manipulated in such a way that they proposed the same solution to the same problem (same raw idea), but had either high or low levels of completeness. The second sample ($n=96$) was a field study involving members of the general public living in the local municipality in rating ideas via an online platform. This allowed me to compare the findings of the lab experiment with the field study in order to control for reliability.

Quantitative analyses of idea evaluation ratings were carried out using PLS-SEM, with the samples being compared to each other as regards the consistency of the observed effects. Essentially, the field study was a reproduction of the laboratory experiment but with a higher level of distortion due to being a real-life situation (evaluators could rate ideas in their homes as opposed to a classroom). The results showed that H1 was not consistent across the samples, being rejected in Sample 1 ($p > .05$) and partially rejected in Sample 2 (holistic quality, $b = .10$, $p < .05$; use value, $b = .14$, $p < .01$). This meant that idea completeness did not have a direct influence on the perception of idea quality. However, hypotheses 2 and 3 were fully supported, suggesting that completeness can reduce comprehension, in turn reducing perceptions of idea quality. Figure 5 illustrates the effects that were observed in both samples from Study 2, i.e. only the reoccurring significant effects are shown. Additionally, it was also found that the use value of the idea was the strongest predictor of perceptions of idea's holistic quality (Sample 1 showing $b = .48$, $p < .001$; and Sample 2 showing $b = .60$, $p < .001$).

Figure 5. Statistical diagram of the mediation model used in Study 2.



*Solid lines show the observed and significant direct effects while dashed lines show the observed and significant indirect effects.

According to the findings, an increase in an idea's completeness acted as an aid as regards increasing the participants' comprehension of the idea's meaning, which then led to a higher perception of idea quality. The direct effect of completeness on idea quality was not consistent between the two samples. Thus, Study 2 confirmed that people generally relied more on their subjective comprehension than on the objective information provided in the idea description when judging the idea to be of high quality.

4.2 Phase 2: Connecting the dots

Given the insight that the subjective comprehension is a significant driver of perceptions of idea quality, the focus of this study shifted towards further exploring how people construct meaning and form an understanding of ideas during screening. This moved the investigation into Phase 2, where a new theoretical and methodological framework was applied. The theoretical framework was informed by the sensemaking approach, since this provided a theoretical connection between the evaluator's sense of identity and the evaluator's behaviour during screening. The methodological framework included fuzzy set qualitative comparative analysis (fsQCA), which allowed the capture of the causal mechanisms that lead to an idea being perceived as good. Study 3 focused on examining the characteristics of the evaluator during idea screening, and whether basic human values could influence the way in which evaluators made sense of and determined the quality of ideas. Study 4, investigated how the idea evaluation process happens in greater detail, and which activities/conditions lead evaluators to perceive an idea of being of high quality.

4.2.1 Step 3: Establishing the role of the evaluator

In order to understand whether the evaluator's identity influences his/her ability to make sense of and decide on the goodness of ideas, the sensemaking approach was used as the theoretical grounding (Weick, 1995). Sensemaking is defined as a process that is triggered by ambiguity and involves attending to and bracketing cues in the environment via cycles of interpretation and action, thus enacting a more ordered environment that results in a sense of understanding (Maitlis and Christianson, 2014). Sensemaking is anchored in retrospection and identity construction, which means that when people are faced with an unclear/ambiguous situation, they reflect upon themselves in order to form an understanding of the situation, leading to the subsequent action (Ring and Rands, 1989).

In order to operationalize the evaluators' sense of identity, the construct of basic human values was used (Schwartz, 1992). This allowed me to examine whether people who are open to change make sense of ideas in different ways compared to conservative people. In order to capture differences of sensemaking, fsQCA was used (Ragin, 2008). This method enabled the tracing of how different individuals

combine together evaluation criteria, leading to a holistic impression of the idea's quality. This meant that the analysis would show the configurations of conditions necessary and/or sufficient for the perception of high or low idea quality.

In order to maintain a high level of approximation of the study with the real-world, the purposeful sampling of experts who deal with idea screening on a daily basis was used. This step allowed an account of the high level of domain knowledge and the experience of the evaluators, and their familiarity with the idea screening task. A leading global IT consulting company was chosen for the context of this study, and a survey for idea screening, containing an open comments section was developed to capture the quantitative and qualitative data.

The sample consisted of 20 experts who were asked to individually rate 12 R&D project ideas using an online platform. In the survey, the evaluators were given several dimensions for evaluating the ideas. The overall impression of idea quality was expressed as a measure of *holistic quality*, which was complemented by the ratings for *originality*, *use value*, *feasibility*, *idea clarity*, and a perception of *confidence* in the overall evaluation. After the survey had been completed, the evaluators were also given Schwartz's test of basic human values. This was used to determine the evaluators' *openness to change* or *conservatism* (Schwartz, 1992), as the personal values characterizing an individual. In addition to this, an analysis of the ideas' *completeness* (based on the conceptualization of an idea and its information content) was done in the same way as in Study 2. Operationalization of the main conditions of the survey was thus consistent between Studies 2 and 3, which at a later stage allowed comparison of the general idea screening behaviours of the users (Study 2) with those of the producers (Study 3).

The results showed that there were differences between *open to change* and *conservative* evaluators as regards the way in which they evaluated the different dimensions leading to their perceptions of holistic idea quality. Evaluators who were open to change preferred ideas that were clear, complete, original and of great value to the user. Conservative evaluators, needed the ideas to be feasible, in addition to having a high level of originality, use value, clarity and completeness. This was in line with the assumption that sets of personal values can influence how evaluators make sense of ideas, and what evaluators consider to be an idea of high quality. The analysis of open comments also demonstrated that open to change evaluators actively commented on the ideas and suggested improvements, while conservative evaluators were not observed to actively comment on ideas, nor provide any improvements. This finding suggested that conservative evaluators perceived idea screening as a decision-gate where they evaluated different ideas. However, the evaluators who were open to change, viewed idea screening not only as a decision-gate, but also as a generative process since they were able to refine ideas and provide constructive feedback on these ideas. Thus, it was found that openness to

change influences the sensemaking of the ideas and the idea screening activity (see Table 7 for the configurations).

Table 7. Configurations of conditions leading to perception of high idea quality. Taken from Study 3, Sukhov et al., (2018), p.10.

	Configuration					
	General	Open to change		Conservative		
	1	2a	2b	3a	3b	3c
Evaluator characteristics						
Openness index		●	●	⊗	⊗	⊗
Idea characteristics						
Idea clarity	●	●	⊗	●	⊗	●
Idea completeness		●	●	●	●	●
Idea evaluation criteria						
Originality	●	●	●	●	⊗	●
Use value	●●	●●	●●	●●	●●	⊗
Feasibility	●		●	●	●	⊗
Evaluation characteristics						
Confidence in the evaluation	●	●	⊗		●	●
Consistency	0.98	0.96	0.97	0.97	0.98	0.98
Raw Coverage	0.66	0.41	0.30	0.45	0.27	0.23
Unique Coverage	0.11	0.01	0.02	0.03	0.01	0.01
Frequency	20	10	1	14	1	1
Overall Solution Consistency			0.97			
Overall Solution Coverage			0.76			

*Note: Black circles indicate the presence of a condition while circles with an “X” indicate its absence. Large circles indicate core conditions while small ones indicate peripheral conditions. Blank spaces indicate: “don’t care”.

Another important observation was that *use value* constituted a key condition contributing to perceptions of high holistic quality, which meant that, in most cases, where use value was considered high, the idea was perceived to be of high quality. However, use value by itself was not enough to lead to perceptions of high quality, with several conditions needing to be fulfilled in order to lead to this judgement outcome.

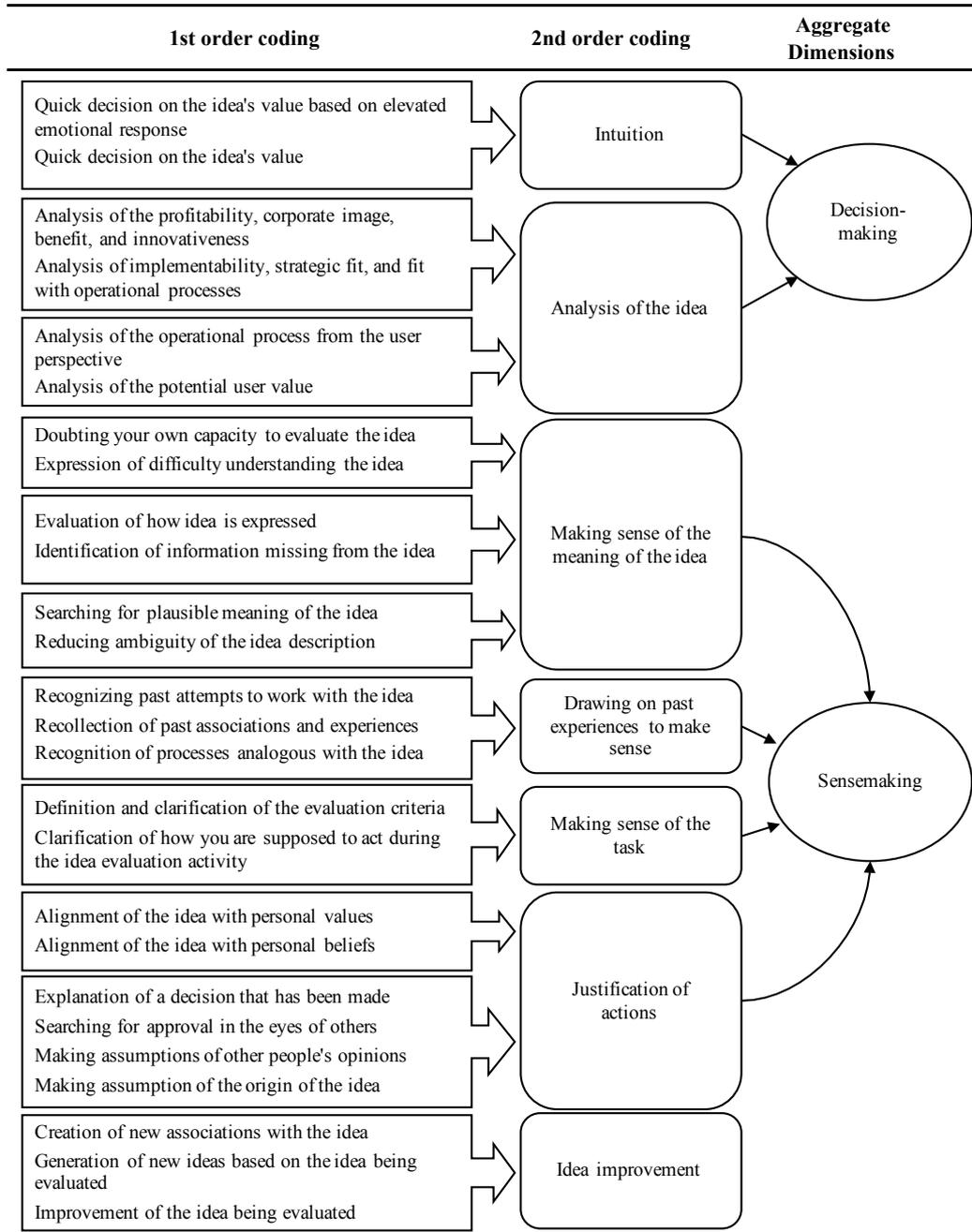
4.2.2 Step 4: Discovering the pathways to high idea quality

In order to gain an even deeper understanding of idea screening, and to explore the full range of activities that the evaluators engage in, it was decided to further explore the processes involved in idea evaluation, and to acquire a more insightful description of which activities lead to an evaluator perceiving high idea quality. This was the aim of Study 4, which took a closer look at how expert evaluators act during screening.

The sample consisted of a total of 14 managers from two different organizations, i.e. a major international Information and Communication Technology (ICT) company, and a major vehicle manufacturer. The inclusion criteria for the participants were having the formal responsibility for idea screening in their day-to-day work and being experts in their fields. Each participant was given a set of ideas and asked to think out loud while they were screening each idea. These ideas had previously been developed at the respective companies by other employees, and were the actual ideas that had been generated during these companies' innovation processes. This resulted in 204 idea screening cases, containing 2,460 activities which were further studied in detail.

In order to understand how evaluators think when screening ideas, their thought patterns were audio recorded using the think aloud method and later transcribed (Ericsson and Simon, 1993). This method produced accounts of individual idea screening cases, which were further analysed using grounded theory techniques (Gioia et al., 2013). This method of data analysis led to empirically-grounded themes for the activities occurring during idea screening (see Figure 6). The next step was to examine which activities led to perceptions of high idea quality. In order to do so, fsQCA was used to discover configurations of activities leading to judgements of high idea quality. Since each of the configurations was linked to qualitative cases, these cases were reviewed for meaningful interpretations of the idea evaluation processes.

Figure 6. Data structure. Taken from Study 4, Sukhov et al. (2019).



Initial grounded coding indicated that there were seven second-order activities that had interacted with each other during idea evaluation (see Study 4 for further details). The activities were coded as: 1) *intuitive judgements* of the idea, 2) *analytical reflection* on the idea quality, 3) *sensemaking of the idea's meaning*, 4) *drawing from past experiences*, 5) *sensemaking of the screening activity*, 6) *justification of actions*, and 7) *making improvements to ideas*.

Furthermore, the fsQCA was used as a method of data analysis in order to find the configurations leading to perceptions of high idea quality. It was revealed that the

evaluators not only screened ideas and determined their quality, they also categorized the ideas into six different activity configurations (see Table 8), which represented the reasons why the ideas were considered good.

Table 8. Configurations leading to a perceptions of high idea quality. Taken from Study 4, Sukhov et al., (2019).

	High quality on short-term		High quality on long-term		High quality on both short- and long-term	
	1a	1b	2a	2b	3a	3b
Decision-making						
Intuition	●	●	●	⊗	●	●
Analysis of idea quality	●	●	●	●		
Sensemaking						
Meaning of the idea	●	⊗				●
Drawing from past experiences	●		●	●	●	⊗
Meaning of the task	⊗	⊗	●	⊗	⊗	⊗
Justification of actions	⊗	⊗		●	●	
Idea improvement						
Idea improvement		●		●	⊗	
Consistency	0.98	0.97	0.82	0.92	0.94	0.82
Raw Coverage	0.04	0.02	0.07	0.02	0.04	0.06

*Note: Black circles indicate the presence of a condition, and circles with “X” indicate its absence. Blank spaces indicate: “don’t care”.

The configurations can be explained in the following manner:

Configuration 1a: ‘easy to do’, where the evaluator combines intuition and analysis, while reflecting on the meaning of the idea and associating it with past experiences.

Configuration 1b: ‘implementable with the potential for improvement’, where the evaluator intuitively finds the idea to be good, analyses it, and then finds a way to develop it further.

Configuration 2a: ‘good but complex’, where the evaluator has a positive intuitive response but upon analysing the idea further, comparing it with past experiences and to the task, he/she finds challenges attached to the idea.

Configuration 2b: ‘potential but needs improvement’, where the evaluator cycles between analysis, sensemaking and idea improvement since the idea is perceived as having great potential but it needs to be improved in order for it to be viable.

Configurations 3a and 3b: ‘something that has worked before’, where the idea provokes an intuitive response, accompanied by an interpretation of what was indented in the idea description.

What these findings indicated was that sensemaking and idea improvement activities occurred in conjunction with intuition and analysis, and that the evaluators cycled between these different activities in order to form perceptions of high idea quality. Based on this closer examination of idea screening cases, it was found that the evaluators actively constructed meaning, which helped them to understand the ideas. Since the evaluators had also tried to improve ideas during screening, this aligned with the behaviour that was observed in Study 3, suggesting that evaluators can engage in the generative mode during idea screening.

4.3 Phase 3: Building explanations

The next step of the research process was to find points of integration between the individual studies by means of outlining the key reoccurring conditions. This was done by reflecting back on the previous steps, viewing the previous studies holistically, searching for important themes, and theorizing explanations for the mechanisms influencing idea screening.

4.3.1 Step 5: Outlining key conditions and mechanisms

During the course of this thesis, three conditions were found to play a visible role in idea screening. First, the idea’s use value showed itself to be a key condition of perceptions of high idea quality (Studies 2 and 3). Second, how the idea was communicated (communication defined as the success of sharing information) played a significant role in how well the evaluator understood the idea and perceived its quality (Studies 1, 2 and 3). Third, the evaluator’s ability to make sense influenced his/her perception of the idea and the idea screening activity (Studies 3 and 4). These three conditions were used as points of integration, since both quantitative and qualitative insights were made available throughout the course of the MMR design. The explanations characterizing each of these conditions follow.

Use value (or user value) was defined by Magnusson (2009) as an evaluation of the idea from the user perspective and whether the implemented idea would create value to its users. The user in this context can be defined as an actor benefiting from the idea if it is implemented. Use value relates to the recognition of the potential benefits of the idea from the perspective of the beneficiary. Building on the conceptual framework of Study 1, the criterion of use value can be related to the evaluator’s understanding of the idea’s problem description, and his/her evaluation of its relevance and importance. A closer analysis of the idea’s use value, between the individual studies, is presented in Table 9.

Table 9. Integration of studies with regard to use value.

Study	Qualitative findings	Quantitative findings	Similarities	Integrative statement
1	Not applicable	Not applicable	Linear relationship between use value and the holistic idea quality is suggested in Study 2, and is confirmed in Study 3, while Study 4 provides a description of how use value is applied, by evaluators, during screening.	When evaluators screen ideas from the perspective of the user, they are better able to understand these ideas' potential benefits and they often have a more positive view of the idea's overall quality. Ideas of high use value are considered to be good. However, use value is not sufficient when it comes to perceiving ideas to be good.
2	Not applicable	Use value has a high correlation with holistic idea quality.		
3	Not observed	Use value is the key condition leading to perceptions of a high idea quality. The absence of use value leads to perceptions of low idea quality.		
4	Analysis of the ideas included reflections on the value to the user (the actor who benefits), being used to help evaluators understand the operational processes from the user perspective.	Analysis of the use value was neither a necessary nor a sufficient condition for perceptions of high idea quality.		

The quantitative findings of Studies 2 and 3 revealed that use value had a strong influence on overall perceptions of high idea quality, exhibiting a linear relationship. Initially, this linearity was assumed during the regression analysis conducted during Study 2. Upon conducting the configurational analysis during Study 3, it was noted that the presence of use value (together with other conditions) led to positive perceptions, while its sole absence was directly related to negative perceptions of idea quality. This supported the notion of a linear relationship between use value and the holistic perception of idea quality. The qualitative outcomes of Study 4 revealed that the evaluators, at times, analysed ideas using the perspective of the user, which helped them to comprehend the relevance of the idea more vividly. However, this analysis was not enough on its own to lead to high idea quality.

According to Denker (2018) and Magnusson (2009), high use value indicates that the problem that the idea addresses is of high relevance and benefit to the potential user, while a high level of feasibility indicates that the solution provided by the idea is appropriate and easy to implement (from the supplier perspective). Given that use value had a stronger correlation with the holistic idea quality, this showed that the evaluators had a greater preference for the ideas addressing important problems and bringing value to the user, rather than ideas proposing solutions with a high level of technical feasibility. In other words, the problem-solution parts of an idea for innovation were not of equal importance in the evaluator's perception of a

good idea. This asymmetry was consistent during the crowdsourcing of idea screening by users during Study 2, and during screening by expert evaluators in Study 3, thus underlining the parsimony of this observation across the different contexts.

The idea's communication was the second notable condition across the studies. This concept incorporated the evaluator's ability to understand the idea on the basis of the information that was presented in the idea description. Analysis of the idea's communication is presented in Table 10.

Table 10. Integration of studies in regard to the idea's communication.

Study	Qualitative findings	Quantitative findings	Similarities	Integrative statement
1	Not applicable	Not applicable	Ideas need to be understood in order to be perceived to be of high quality. Greater completeness helps the evaluators to make sense of ideas. Failure to understand can lead to perceptions of low idea quality.	The idea's clarity of communication and the evaluator's understanding are important conditions during screening. Well-developed ideas can aid understanding, but are not enough to lead to perceptions of high quality.
2	Not applicable	Greater idea completeness improves perceived comprehension, which leads to higher perceptions of idea quality.		
3	Not observed	Greater idea completeness helps in making sense and leads to a more positive judgement.		
4	Evaluators who recognized ideas and connected ideas with their past experiences were inclined to rate these as high-quality ideas.	Ease of recognition of an idea on its own was not a sufficient condition for perceiving the idea to be of high quality.		

The conceptual framework of Study 1 suggested that the main role of an idea for innovation during the idea screening process is to communicate a narrative regarding how a certain problem can be solved. Previous research has addressed this as the need for an idea to provide sufficient information on how a problem is to be resolved; additionally, its completeness is important for how it is perceived with regard to quality (Dean et al., 2006). Study 2 clarified that it was not the idea's level of completeness that influenced perceptions of idea quality, but the evaluator's degree of understanding. Greater completeness had an indirect effect by providing the evaluator with a clearer understanding, which then led to a perception of higher quality. Further studies have shown that an idea's completeness was important for understanding that idea (Study 3); however, no direct link could be established with perceptions of idea quality (Study 2), and it was neither a necessary nor a sufficient

condition (Study 3). Study 4 further illuminated the fact that when the evaluators find ideas easy to understand, being able to draw analogies and connect ideas with past experiences, this helps them to categorize ideas and form perceptions about idea quality.

Finally, the evaluator’s ability to make sense was seen as a core process during idea screening. Sensemaking was expressed via four main activities: i) making sense of the meaning of the idea, ii) drawing from past experiences, iii) making sense of the idea screening task, and iv) justifying actions. An analysis of the evaluator’s sensemaking activities is shown in Table 11.

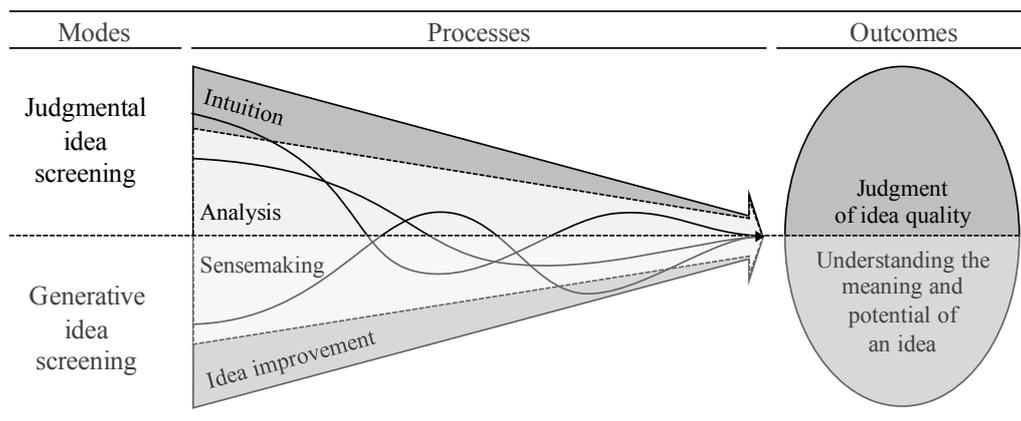
Table 11. Integration of studies with regard to the evaluator’s sensemaking.

Study	Qualitative findings	Quantitative findings	Similarities	Integrative statement
1	Not applicable	Not applicable	Sensemaking activities influence idea screening behaviour. During screening, evaluators make ideas meaningful, drawing from past experiences, make sense of the task in hand and justify their actions.	Evaluators have the ability to construct meaning from the ideas and have a wider understanding of the processes going beyond the task of producing judgements. Idea screening is a complex process in which judgemental and generative modes of screening are intertwined, leading to perceptions of high idea quality.
2	Not applicable	Perceptions of idea quality are dependent on subjective comprehension of the ideas. Idea screening is not an informed decision process.		
3	Evaluators who are open to change view ideas as opportunities and can improve them during idea screening.	Human values influence how evaluators make sense of ideas, idea screening tasks and perceptions of idea quality.		
4	Evaluators use sensemaking to categorize ideas and apply a portfolio logic while screening. Evaluators are also able to improve ideas during screening.	Perceptions of high idea quality result from interplay between intuition, analysis, sensemaking and idea improvement.		

It was clear that, during idea screening, the evaluators were affected by their comprehension. During Study 2, evaluators preferred ideas that they could understand, while rejecting those they could not. However, Study 4 revealed, difficulties connected with comprehension, in some cases, could be counteracted by actively engaging in sensemaking activities. For instance, when the idea was written in a technical language, by listing various specifications that could be implemented as solutions, the evaluator struggled to understand the purpose of the idea and thus did not

know how to evaluate it. However, when the evaluator tried to engage with the idea and construct a narrative in which the idea's solution made sense, the quality of that idea was perceived to be high. Study 4 has illustrated these activities, showing that the evaluators were able to actively construct meaning from the ideas, to reflect on their own roles, and to further improve ideas (which was also observed during Study 3). These sensemaking activities helped the evaluators to form an understanding of what the idea could be by envisioning its future potential, instead of dismissing this idea just because it was difficult to understand. This also led the evaluators to perceive complex, difficult to understand, and non-feasible ideas as being of high quality, given that the evaluators were able to refine the ideas. These manifestations of sensemaking interlaced with the analytical and intuitive processes of evaluation and illustrated the possibility of a different mode of screening, namely a generative mode. As proposed in Study 4 and illustrated in Figure 7, perception of idea quality involved different types of processes where evaluators oscillated between intuition and analysis, combining it with sensemaking activities and idea improvement, to form an understanding of the idea and determine its overall quality.

Figure 7. Illustration of the idea evaluation processes. Taken from Study 4, Sukhov, et al. (2019).



Based on the qualitative and quantitative insights gained from these findings, and aided by the lens of Critical Realism, it was possible to theorize explanations for the mechanisms that prevailed during idea screening. This positioning enabled me to understand that the key conditions mentioned above were also parts of different mechanisms, and were arranged in multiple layers influencing idea screening outcomes. According to Hedström and Wennberg (2017), as well as Pajunen (2008), a mechanism was defined as a process that is initiated by a certain event and leading to a particular outcome that completes this process. A mechanism is also composed of different components that exert causal powers, including both social and natural phenomena; each outcome of a mechanism could also become a component that forms part of another mechanism (Danemark et al., 2002; Devitt, 2006).

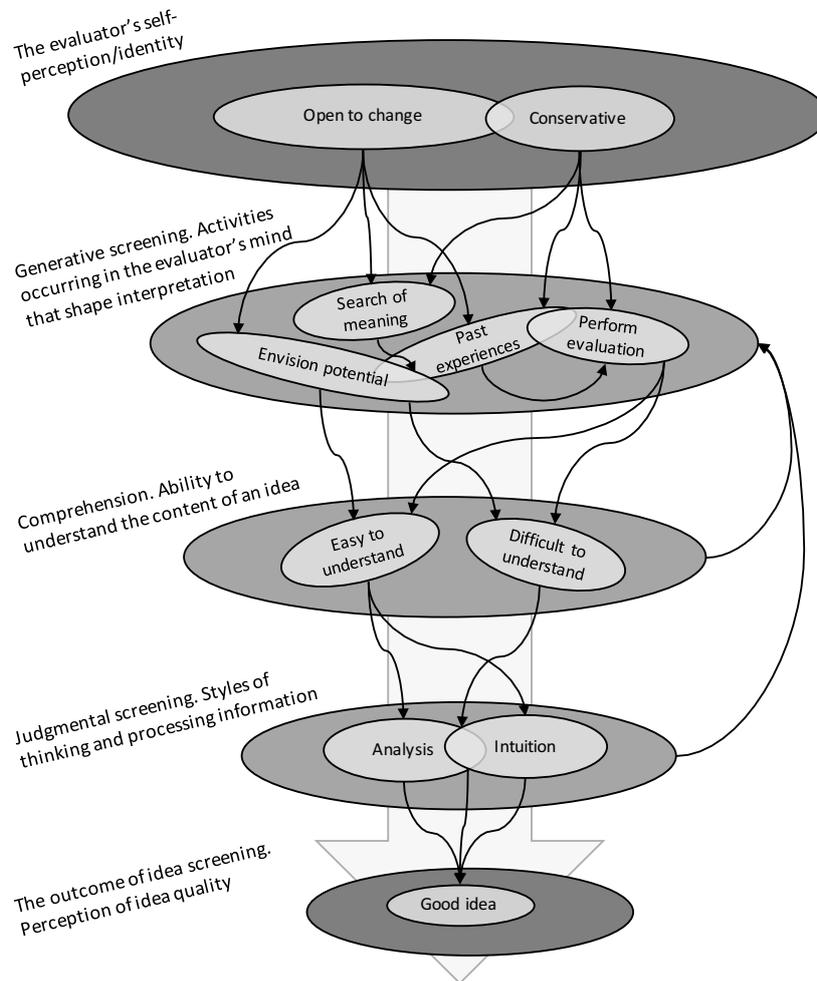
Using this logic, it followed that the evaluator's self-perception (e.g. values and beliefs that shape identity), could be understood as a mechanism consisting of multiple human values (Schwartz, 1992) which help the evaluators to form a foundation for their perceptions and actions (Weick, 1995). This means that the evaluators exhibiting a high level of openness to change are conditioned by certain values, leading them to perceive ideas and the idea screening activity as a generative process whereby a preference is shown for ideas that are novel and useful.

In Study 4, generativity was explained as a mode of idea screening whereby the evaluators engage in sensemaking and idea improvement activities, actively construct meaning, interpret and form a certain type of comprehension of an idea. Since it was shown that a high degree of openness also induced the evaluators' generative behaviour, openness was viewed as a condition that influenced generative idea screening. The outcome of generativity was the construction of a plausible understanding of the idea, entailing that this generativity led to the ability to understand the content of an idea. These meaning-making activities could therefore be understood with the help of the sensemaking perspective (see, for example, Le Glatin et al., 2017; Ulrich et al., 2015; Weick, 1995).

The evaluator's subjective comprehension constituted another mechanism that was shown to mediate that evaluator's perception of idea quality. The evaluator was presented with an idea, and then either expressed its narrative as easy to understand or struggled to comprehend it. When the idea was easily recognized, this led to a rather direct process of evaluating its quality, whereas, when the evaluator did not understand the idea, this exerted a negative influence on how the idea quality was perceived (Schwarz, 2004). The conditions that influenced comprehension partially stemmed from the ability to make sense and the ability to construct a plausible frame of reference for the idea, but they also included other factors, e.g. the idea's completeness (Yus, 1999). This meant that the mechanism of comprehension was also influenced by the idea's physical properties (the information in its description), and was not a purely a product of the evaluator's mind.

Another mechanism that can be outlined was the judgemental mode of idea screening, where the evaluator forms a perception of whether the idea is good or not good (see Figure 8). During idea screening, the evaluators iterated between intuition and analysis in order to compare the idea with certain frames of reference and to form an opinion about its quality (Evans, 2008; Hodgkinson and Sadler-Smith, 2018; Stierand and Dörfler, 2016). This process was influenced by comprehension and generativity and even the evaluator's self-reflections, entailing that judgmental screening was informed by a multitude of different cues and conditioned by a wider range of activities than was previously outlined in the idea screening literature. The outcome of this mechanism was the evaluator's overall perception of idea quality.

Figure 8. Mechanisms involved in idea screening.



*The arrows in this figure indicate a hypothetical chain of events based on the research findings and do not represent a sequential process of idea screening.

Based on the conceptual model illustrated in Figure 8, we can see that the outcome of idea screening, i.e. perception of idea quality, is a product of multiple different mechanisms which can be understood with the help of corresponding theories. The concept of stratified reality also allows us to conceptualize different layers in which these mechanisms originate, and observe the outcomes that they produce (Danemark et al., 2002; Pajunen, 2008). Overall, this model shows that there could be different configurations of activities that lead to occurrence of an event, and that it is possible to identify and study these mechanisms by applying a more holistic perspective on the phenomenon of interest. More importantly, without the knowledge of a mechanism as a whole we would struggle to understand the internal complexity of the activities leading to the perception of a good idea, and we would struggle to explain how and why this phenomenon occurs.

5 Discussion

The purpose of this chapter is to develop explanations for the idea screening phenomenon and to expand our current understanding in light of the empirical observations. This is done in three steps. First, the initial research questions are revisited and elaborated on. This helps to converge the findings and address the initial aim. Second, the theoretical framework of idea screening is expanded upon to encompass the generative perspective and to reveal the human side of idea screening. This is accomplished by taking a different perspective on (1) what constitutes an idea for innovation, (2) the role of the evaluator, and (3) the view of the evaluation process, broadening our understanding of the idea screening phenomenon. Third, this change of perspective is used as a basis for a discussion on the current status of research within idea management further consolidating the expanded theoretical framework.

5.1 Revisiting the research questions

The first research question: ‘What are the components of an idea for innovation, and how do they affect screening?’, was primarily addressed by the conceptual framework of Study 1, and was further elaborated upon by the empirical findings from Studies 2, 3, and 4. The conceptual model of an idea for innovation (see Figure 4, on page 42) outlined the fact that an idea can be understood as a combination of a problem description (identifying a situation that is deemed unsatisfactory by an actor), and a suggestion for a solution (by explaining a procedure and the resources that are required to solve the problem in a certain context). In line with previous research, the findings confirmed that, during screening, ideas were viewed as problem solutions, but that the degree of information presented in the idea description did not have a direct impact on perceptions of idea quality. Importantly, ideas need to clearly communicate the problem that they are addressing and to connect to the evaluator’s understanding of the problem in order to be considered good. This changed my initial conception of an idea as ‘a description’ (Dean et al. 2006) into ‘a narrative’ (Hietanen et al., 2014), emphasizing the importance of the story and the connectivity of the idea to the evaluator, rather than putting an emphasis on the formal specifications that it needs to convey.

It was also found that the evaluator’s personal values and beliefs could change the interpretation of an idea and the idea screening activity. This affected the frame of reference in which the idea was being evaluated. Specifically, the evaluators were triggered by multiple cues that affected their perceptions of the idea’s quality: the idea’s description, the ability to understand the idea, intuitive associations, personal views, domain knowledge, and even the lack of knowledge (see Figure 6 illustrating the Data Structure on page 50 for further detail). This meant that the evaluators viewed ideas as dynamic entities that could be altered and re-interpreted by changing their understanding of idea screening. However, it was also possible for the

evaluators to treat ideas in a conventional manner, and to evaluate them as descriptions that explain how a problem could be solved. The presence of both of these perspectives indicated that the evaluators could both perceive an idea as an object and have a direct opinion on its quality (engaging in the *judgemental* mode), but also as a trigger leading to more sensemaking and improvement activities (engaging in the *generative* mode). The presence of these behaviours highlighted different characteristics regarding the idea’s purpose and communication, and perceptions of its quality (see Table 12 for the full list of characteristics).

Table 12. Characteristics of an idea for innovation.

Perspective	Characteristics	Explanation	References
Ideas as objects	Ideas have a functional purpose.	Ideas set the direction of the future course of action by indicating how a problem is to be solved, i.e. what needs to be done and how.	(Osborn, 1957; Koen et al., 2001; Kahn et al., 2013)
	Ideas need to effectively communicate their intentions.	Ideas identify specific problems and describe potential solutions. Ideas need to provide information by being complete and clear.	(Dean et al., 2006; Florén and Frishammar, 2012; Onarheim and Christensen, 2012)
	Idea quality is determined through the idea’s functionality (ability to solve the problem and to be implementable).	Ideas can propose a more or less effective resolution to a certain problem, which is relevant and realistic.	(Dean et al., 2006; Suh, 2001)
Ideas as triggers	Ideas have a generative purpose.	Ideas trigger new associations and can lead to the generation of new ideas.	(Hatchuel and Weil, 2009; Le Glatin et al., 2017; Ulrich et al., 2015)
	Ideas need to resonate with and inform the evaluator.	Ideas inform evaluators of the user’s preferences and possible alternatives.	(Kristensson and Magnusson, 2010; Magnusson, 2009; Ozer, 2009)
	Idea quality is determined through the evaluator’s interaction/engagement with ideas.	Ideas can cause varying degrees of engagement and inspiration, and the envisioning of other alternatives.	(Riedl et al., 2011; Stierand and Dörfler, 2016; Ulrich et al., 2015; Zhu et al., 2019)

Table 12 shows that there are at least two different perspectives which the evaluators apply when screening ideas. Based on these perspectives, the idea’s purpose, the role of communication, and perceptions of idea quality can easily change. Although some of these characteristics are to be found in previous research studies (see references in Table 12), they have not been outlined in their entirety thus far.

By exploring the role of ideas in further depth, and focusing on the importance of the evaluators’ interactions with ideas, I propose that a more realistic understanding

of ideas for innovation can be achieved by viewing ideas as vehicles of representation (similar to Descartes' theory of ideas, see Smith, 2007). In this view, a distinction needs to be made between the form of description of an idea, and the idea's content. Here, the form of description of an idea concerns the physical form in which the idea is expressed, i.e. the idea acts as body containing information. However, the content of the idea, i.e. its subject matter, is what is produced by the intellect of the person interacting with that idea (intellectualization is required in order to understand what the idea is proposing). This means that, during screening, ideas are primarily objects of the evaluator's mind, rather than immediate objects (Smith, 2007). Thus, ideas require human interaction and intellectualization in order to distinguish and understand the principles that the ideas are suggesting (Pierce, 1878).

This view of ideas is important as regards understanding their intricate nature, and as regards how they can be viewed by the evaluators during the innovation process. Idea screening, and evaluation criteria could therefore be designed for different purposes, not only consisting of judgements and the selection of the best ideas, but also acting as triggers for people who can envision their potential. The evaluators could be encouraged to enhance an idea's potential beyond what the creator of this initial idea had envisioned; thus, ideas could integrate the creative insights of different people and possibly increase their chances of implementation. Focusing on the evaluators' ability to comment on and respond to ideas when these are presented to the public could be a different approach to asking a crowd to rate idea quality. In other words, instead of determining an idea's 'goodness' based on a popular vote, the content of the comments could be harvested in order to improve the idea further. Thus, both ideas and the idea screening activity could have different purposes compared to how they have been defined in the traditional new product development literature.

The second research question: 'How do the personal characteristics of the evaluator influence idea screening?', was the main focus of Study 3. The study revealed that, among the evaluators with a high level of domain knowledge (experts in the field of IT), there were differences in how these evaluators perceived holistic idea quality and the idea screening task. Evaluators who were *open to change* preferred ideas that they considered to be novel, had a high use value, and were mostly understandable, without needing these ideas to be feasible. This meant that the evaluators who were open to change, characterized ideas as novel and useful and indicated their preferences for this type of idea, while evaluators who predominantly had *conservative* values showed preferences for ideas that they categorized as useful and implementable. Further analyses revealed that these sets of human values also reflected upon the evaluators' interpretations of the idea screening task. Open to change evaluators were inclined to refine and suggest further improvements to ideas, while conservative evaluators were not triggered into doing so. This indicated

that the evaluators' basic human values (Schwartz, 2012) acted as a mechanism that influenced their behaviour during idea screening.

Additionally, Study 4 also revealed that personal values and beliefs were frequently used by expert evaluators to justify their actions during idea screening, and that some evaluators more than others were triggered into suggesting further improvements to the ideas. Although explicit accounts of how evaluators perceived themselves were not measured during Study 4, it was noted that personal values, individual associations and past experiences are frequently used by the evaluators during idea screening. This means that, during screening, evaluators not only rely on their domain knowledge, but also mobilize a broader range of sensemaking and improvement activities which influence their perceptions of ideas. Thus, the evaluators' personal values and experiences interact with their domain knowledge and may create differences in how they act, and what they favour during idea screening. Study 3 also hinted that the typology of openness to change versus conservatism could act as a means of identifying people who are more inclined to generatively screen ideas, and who value novelty and openness over an idea's feasibility.

Finally, the third research question: 'What activities do evaluators engage in when screening ideas and how do they perceive idea quality?', was addressed in Studies 2, 3, and 4. What became evident was that idea screening is, in fact, a complex phenomenon whereby people needed to engage in both sensemaking and decision-making activities (as was illustrated in Figure 6 on page 50). Generally, the evaluators dealt with the demanding process of categorizing, understanding, comparing and relating the idea to existing knowledge, and of finding a frame of reference in order to make a decision about the idea quality (by having to specify or define their own criteria). Study 4 revealed that the evaluators employed different types of sensemaking and improvement activities which, jointly with intuitive and analytical processes, produced judgements regarding idea quality. In other words, intuitive responses, analytical reasoning, past experiences and the ability to improve an idea, collectively acted as cues forming an overall impression of idea quality.

It was also found that the initial difficulty of understanding ideas (the comprehension mechanism), was in some cases counteracted by the evaluators' ability to make sense of the ideas (the generative mechanism), resulting in a positive perception of idea quality. For instance, if the idea was difficult to understand, or the criteria for evaluating the idea were not clear, the evaluator actively constructed a plausible frame of reference in which the idea was considered good. Hence, the evaluator was able to identify the conditions (as well as construct the criteria) in which an idea was seen to be of high quality. This means that the evaluators did not always act as gatekeepers who evaluated ideas using a particular frame of reference, dismissing ideas that did not fit with certain criteria. Instead, the evaluators were proactive during screening, constructing different frames in which ideas were considered to be of high quality.

All in all, addressing these research questions during the course of this investigation provided an empirical ground for enhancing our understanding of idea screening and of the activities that the evaluators are involved in when evaluating ideas. The following section provides a more detailed theoretical grounding for these activities which leads to an expansion of the idea screening framework.

5.2 Expanding the idea screening framework

Making sense of, and forming an understanding of, an early idea for innovation concerns acquiring relevance and meaning for the idea. According to Weick (1995) and Weick et al. (2005), human actors engage in the search for plausible meaning by constantly framing the objects around them. The conceptual framing during which people construct meaning for these objects often comes from people's previous knowledge, beliefs and experience. Weick (1995) proposed that people do not only rely on their knowledge and recollection of past experiences to guide their action, but on their ability to make sense of the broader organizational context, drawing on the construction of their own identity.

The sensemaking process is triggered by ambiguity and the discrepancy of a situation (Sandberg and Tsoukas, 2015; Weick et al., 2005), which aligns with the typical idea screening scenario with regard to ill-defined, incomplete ideas that may propose things that do not exist (Hatchuel and Weil, 2009; Le Glatin et al., 2017). According to the sensemaking perspective, in such situations, the evaluator would actively search for and try to apply familiar labels and analogies in order to form an interpretation, so that the idea may be made meaningful (Maitlis and Christianson, 2014; Weick, 1995). Thus, sensemaking has an important role during idea screening, since it affects how evaluators frame ideas (Ulrich et al., 2015) that influences their subsequent actions (Ring and Rands, 1989). Despite the wide range of characterisations of sensemaking in the literature, Maitlis and Christianson (2014) have summarized and developed the following overarching definition of sensemaking as:

“A process, prompted by violated expectations, that involves attending to and bracketing cues in the environment, creating [...] meaning through cycles of interpretation and action, and thereby enacting a more ordered environment from which further cues could be drawn.” - (Maitlis and Christianson, 2014: 67).

This definition can be divided into four main themes, all of which were all observed during the empirical studies conducted during this thesis project. This empirical relevance creates further support for using sensemaking to inform idea screening. First, sensemaking is regarded as a dynamic process, or a 'reoccurring cycle' that does not follow a strict sequence of events but cycles between different stages (Weick et al., 2005). This trait was shown in Study 4, where the evaluators cycled between different modes of thinking, reasoning and understanding in order to find appropriate meaning for the idea and its quality.

Second, the violation of expectations, or simply facing something that was unexpected, plays a key role in sensemaking (Maitlis and Christianson, 2014). This means that sensemaking can be triggered by different cues (e.g. new ideas, objects, events, or situations) that are perceived as ambiguous, surprising or confusing by an individual. In order to reduce this potential ambiguity, people try to find order by creating familiar categories and by labelling these cues as something that they already know and are able to recognize (Weick et al., 2005). On the one hand, Study 2 has shown that the degree of idea completeness influenced the evaluators' subjective comprehension of the ideas. When ideas were incomplete, evaluators struggled to make sense of them, resulting in a low level of comprehension. On the other hand, Study 4 has revealed that, when the evaluators struggled to understand ideas, but were given the opportunity to reflect, they actively extracted different cues from their past experiences, analytical reasoning, and intuitive associations, and were then able to form an interpretation of an idea and whether or not it could be labelled as 'good'. Thus, different types of cues could be extracted from the context in order to help the evaluator to frame an idea.

Third, sensemaking is generally regarded as social since individuals are embedded in a sociomaterial context (Tinggaard, 2012) where their thoughts, feelings and behaviours are influenced by the presence of others (Weick, 1995). This was shown in Studies 3 and 4, where the evaluators related ideas to their own values and beliefs, and their presumptions about other people's opinions, something which was also reflected in their judgement outcomes. Study 4 has explicitly shown that evaluators constructed justifications for their intuitive judgements in order to rationalize and legitimize these judgements.

Finally, sensemaking concerns the actions that people take in order to make sense of a situation which they seek to understand (Maitlis and Christianson, 2014). These action-meaning cycles occur repeatedly as people construct provisional understandings which they continuously enact and modify (Maitlis and Christianson, 2014; Ring and Rands, 1989). This was observed in Study 4 where the evaluators recognized ideas through their past encounters with similar ideas, and tried to act in harmony with their past experiences. Thus, evaluators made sense of ideas by enacting sensible environments, and drawing connections with a broader context than the idea had initially entailed.

Idea improvement was also seen as an important activity during idea screening. However, in this study, it was separated from the sensemaking activities and viewed as an manifestation of creativity, expressed as an act of divergent thinking that resulted in new ideas or idea adjustments. This distinction allowed the clearer operationalization and addressing of the sensemaking process whereby the evaluator tries to reach an interpretation, and of idea improvement as the activity whereby the evaluator produces new ideas. Together, these activities resulted in the genera-

tive mode of idea screening (similar to the generative action of Le Glatin et al., 2017).

Based on the findings of this study, **idea screening did not follow the conventional definition** of “a process of evaluating and selecting new ideas or concepts that can be put in the project portfolio” (Kahn et al., 2013: 469). It also became clear that this definition stems from the top-down technical decision-making perspective, and describes what idea screening should do (act as a gate during a wider innovation process), rather than explaining what happens during idea screening (Cooper and Sommer, 2016). In fact, based on the activities that the evaluators employed during idea screening, a substantial part of that screening dealt with recognizing and interpreting ideas, or even reconfiguring and generating new ideas in addition to determining their quality. This realization extends our existing conception of the evaluators, and of the role that ideas play during screening. Given that a substantial body of extant research into idea screening has focused on improving the performance of organizational procedures and embracing the technical perspective, the human side of idea screening has been lost. Based on the findings of this thesis, I propose that a more refined and human-centric definition of idea screening:

A process during which an evaluator actively engages in a range of activities to form an understanding of an idea, categorize that idea, envision its future potential, and apply a frame of reference in order to determine its quality.

From this definition, the existing theoretical framework of the technical decision-making perspective can be expanded. This expansion integrates the generative mode and the theoretical orientation of sensemaking, resulting in a more human-centric view of idea screening (see Table 13).

Table 13. An expansion of the idea screening framework.

Elements of idea screening	Technical decision-making perspective	Generative screening perspective	Integrated perspective
The idea	Ideas are units of information (objects) describing a problem-solution for a new product or process.	Ideas are triggers for new associations, and can lead to the generation of new ideas.	Ideas are communicated as narratives that can inform and/or incite the evaluator into envisioning a certain problem-solution for a product or process.
The evaluator	The evaluator is mainly understood as the embodiment of domain knowledge. Domain knowledge takes the form of use(r) and producer knowledge (what the user needs, and what is possible to accomplish).	The evaluator is an individual who is composed of multiple layers of past experiences, values, beliefs, roles and perceptions, which shape that evaluator's identity.	The evaluator is an individual with certain values and beliefs who cycles between domain knowledge and personal reflections in order to formulate a perception of an idea.
The evaluation process	A rational and/or intuitive judgemental approach by which the evaluator comes to a conclusion about idea quality.	A process whereby the evaluator engages in sensemaking and idea improvement activities in order to understand the meaning and potential of an idea.	An iterative process of sensemaking activities, intuition, analysis and idea improvement by which the evaluator comes into a conclusion about idea quality.

This expansion of the idea screening framework helps to resolve several issues. First, as was exemplified in Section 2.3, studies of idea screening that relied on the technical decision-making perspective lacked a consistent definition of an idea for innovation. The main problem concerned the lack of clarity of the information content in the idea description, leading to different views of what qualifies as an idea, and how to determine idea quality. The generative perspective helps us to understand that ideas may also act as narratives that inform the evaluator about a problem-solution for a new product or process. This conceptualization signifies the role of the meaningfulness of the idea to the evaluator. In other words, ideas can take different forms and can implicitly be understood by evaluators; however, their main purpose during screening is to inform the evaluator and to help him/her to realize the potential value of the idea. This potential can lurk both in the content of the idea and in what it suggests, but also in the engagement it can create in the evaluator. Therefore, some ideas can trigger a unique interpretation in a specific evaluator who is then able to realize the idea's full potential. In order to improve the evaluator's comprehension of the idea, and the likelihood of it being selected for further development, its narrative needs to be clearly communicated, and the

problem needs to be considered important, while the solution that the idea describes does not seem to be as essential during this early phase of the innovation process.

The generative perspective also changes our understanding of the evaluator and the role that the evaluator has during screening. As was shown in Studies 3 and 4, the past experiences and personal values of the evaluator (openness to change and conservatism) interacted with conscious and effortful thinking processes. This led to the evaluator having a wider frame of associations, at times even changing his/her behaviour in terms of creating new ideas in light of personal interpretations. This makes the evaluator an essential part of idea screening whereby his/her **interaction with the ideas is something that helps to construct high quality**. Additionally, understanding the evaluator as an individual with values such as openness to change and conservatism opens up new doors for identifying which evaluators have a more open and constructive view of ideas, which is helpful in developing ideas further, while conservative evaluators can be more useful as gate-keepers, during the later phases of the innovation process.

Our understanding of the evaluation process can also be expanded. While Eling et al. (2015) and Hodgkinson and Sadler-Smith (2018) showed that the evaluators can engage in different thinking styles when processing ideas and reaching decisions about their quality, this study shows that idea evaluation is not only about reaching a decision. Idea screening can also be understood as a process of forming new knowledge, engaging in generative activities, and connecting ideas to a wider organizational framework (Kihlander and Ritzén, 2012; Le Glatin et al., 2017; Petervari et al., 2016; Tanggaard, 2012; Ulrich et al., 2015). This changes our conception of idea screening so that we realise that it is not only about determining idea quality, but also about envisioning the potential of ideas and refining them into new narratives.

5.3 Consolidating the theoretical framework

By extending our theoretical perspective beyond that of technical decision-making, and by more closely studying the activities involved in idea screening, we can see that idea screening is not only about the evaluation and selection of ideas, where the evaluators want to reduce uncertainty (as was claimed by Kahn et al., 2013; Van de Ven, 1986). Idea screening is also about creating and pursuing new opportunities, where the evaluators use different cues as heuristics to obtain a fuller picture of the idea, thus helping them to envision the idea and its future potential. As has been described in previous research, the evaluators look favourably at ideas that can be implemented (Dean et al., 2006), and at the ideas that are easy to understand (Song and Schwarz, 2010). However, as this study has demonstrated, they are also open to ideas which are complex, challenging, and original, and which address important problems that the evaluators can relate to. This means that the evaluators

are not only looking for ideas that can be implemented from the producer perspective, they are also drawn to ideas that should be implemented since they will be important to the user.

This broader understanding of the activities that occur during idea screening also informs our fundamental assertions regarding the role that idea screening plays during the innovation process. Traditionally, idea screening has been based on the premise that people with an appropriate level of expertise are able to make decisions about which ideas to adopt and which to reject (Amabile, 1982; Baer and McKool, 2009; Rogers, 1995), and that domain knowledge is what gives the evaluators their ability to recognize potentially successful ideas (Hammedi et al., 2011; Lilien et al., 2002; Luthje and Herstatt, 2004; von Hippel, 1998). These assertions are in close proximity to the perspective that ideas for innovation act as descriptions of objective opportunities that can be discovered (Alvarez and Barney, 2007), being independent of human belief and action (Foss and Klein, 2017). This means that it is possible for ideas to be objectively good (i.e. to be the right ideas that will result in successful innovations), and that organizations can improve the quality of idea screening by enhancing its accuracy (e.g. reducing biases) in order to find these ideas. However, in the context of innovation management, the future success of the idea cannot be known in advance (Van de Ven, 1986) simply because the future is uncertain and has not yet been constructed (Ramoglou and Tsang, 2016). Given the empirical support provided by this investigation, we can see that the evaluators do not act as knowledge entities who ‘know’ which ideas are good, nor are they completely swayed by their personal beliefs. Instead, the evaluators are informed by their knowledge when assessing the plausibility of an idea being good.

This underlines the relevance of understanding idea screening from a realist perspective. In this perspective, ideas do not act as opportunities in and of themselves, but rather as whispers that outline the propensities for future success (see Ramoglou and Tsang, 2016). This means that ideas for innovation can propose a certain product that is demanded by users and is possible to implement, indicating a potential for success; however, even if the idea is considered to be good, it will not be able to guarantee that the product will be successful. In the light of this perspective, the opportunity (or a problem-solution) that the idea proposes acts both as a metaphor and as shorthand for the evaluator’s beliefs and judgements regarding the idea’s future (Foss and Klein, 2017). This also means that the evaluator’s ability to identify good ideas is guided by his/her ability to imagine the state of the world in which the idea can lead to potential success, and that him/her needing to believe that this state of the world is possible. Not until after the implementation of the idea, and the realisation of its value, will it be possible to know whether the idea led to a successful opportunity (Ramoglou and Tsang, 2016). Thus, relying purely on the domain knowledge of the evaluator provides a rather limited view of idea screening. Evaluators are also able to envision possible scenarios where the idea can be successful, and add further detail to that idea’s narrative by actively interact-

ing with other ideas that they consider good. These interactions can enrich the narrative of the idea and connect with other people, improve the idea's legitimacy within the organization, and thus also improve the chances of the idea being realized (Perry-Smith and Mannucci, 2017).

The findings have demonstrated that evaluating an idea is not a straightforward process and that perceptions of idea quality may be a product of various interfering mechanisms. Perceptions of the idea's quality were mediated by the evaluator's ability to understand the idea, which acted as a mechanism of comprehension. In order for the evaluators to form an understanding, they reacted to different cues that were either present in the idea description or in their own minds, using memories and personal reflections. This enabled the evaluators to also overcome the difficulty of comprehending by engaging in the generative mode of screening. However, in order to achieve a perception of idea quality, the evaluators still had to iterate between generative and judgemental screening, while their perceptions of their own identities had also exerted an influence on how the evaluators viewed ideas and the idea screening task. This means that behind the observable actions of the evaluators (e.g. making decisions about idea quality) lie multiple layers of different cues that condition the evaluators' behaviours and perceptions of idea quality during screening (see Figure 8 on page 58). Thus, by understanding these layers, we are also able to better understand how and why the evaluators behave in the ways that they do, and we are able to provide clearer theoretical explanations.

The risk implicit in not expanding our understanding of idea screening, and for example, in continuing to view idea screening as a decision gate is that this view can neglect other important processes which happen during screening and which can help us to improve this process. For instance, although the phenomenon of risk avoidance (a preference for the non-original ideas) during idea screening has been highlighted in research (Licuanan et al., 2007), it has also led to the conception that there are biases that occur during screening, and that these biases should be minimized by improving the quality of the idea screening process (Van de Ven, 1986). Conversely, by widening the perspective on idea screening, this risk avoidance can be understood as a process of legitimising one's decisions in the broader organizational context (Florén and Frishammar, 2012; Kihlander and Ritzén, 2012; Perry-Smith and Mannucci, 2017). Since expert evaluators can represent a board of decision-makers, they may see other processes that go beyond the idea being put before them, and also beyond the criteria that they use to analyse idea quality (Ilori and Irefin, 1997). As was shown by the findings, the evaluators can apply the portfolio logic as early on as during idea screening, also being able to appreciate ideas that they perceived to be incremental and radical (Studies 3 and 4). This means that risk-avoidance behaviour does not necessarily manifest itself in a preference for the non-original, in fact being more sophisticated. For instance, by appreciating different types of ideas, the evaluators are able to diversify the potential risks and deal with uncertainties, and to develop a balanced portfolio of high-quality ideas that

pass into the later stages of the innovation process. Therefore, approaching idea screening in a more informed way can help us to embrace the human side of idea screening, and to tap into its full potential.

6 Conclusion

Why is an idea good? The answer that we might all initially have is “because it fits within a certain criterion”. This logic has been so obvious that it was taken for granted and widely applied to a large body of new product development research. What this study illustrates is that this answer does not actually capture the empirical observations of experts making judgements regarding idea quality. A good idea for innovation simply does not fit into a certain frame of reference on its own. An idea is only good if the evaluator looking at it can understand the frame of reference and see how it can fit. Although this is a subtle adjustment, its consequences might change how we might understand the innovation process.

The aim of this thesis was to explore and examine idea screening from the evaluator’s perspective in order to obtain a better understanding of idea screening itself. What was shown in this thesis was that ideas require efforts on the part of the evaluators to turn them into high-quality ideas. Even among evaluators who are formal decision-makers, with vast knowledge and expertise, there could be different perspectives on what constitutes an idea that is of high quality. In fact, ideas are still undergoing the process of creation while they are being evaluated, with the evaluators imbuing ideas with meaning while simultaneously trying to understand what they have in front of them, and what it can lead to. Thus, the presumption that there are evaluators who can spot potentially successful ideas for innovation is not entirely true. Instead, there are evaluators who can understand the potential of the ideas; however, in order for this to occur, they need to have both knowledge and experience, along with the possibility of further improving ideas while screening them, so that their generative efforts are made explicit. Otherwise, there is a risk of missing out on the efforts that the evaluators are making, and thus losing the potential idea improvements that could be made.

This change of perspective emphasizes the importance of the evaluator doing the screening, and of the evaluator’s abilities to understand, recognize, and analyse the idea. It also emphasizes the evaluator’s personal characteristics and attitudes, his/her unique past experiences and recollections, in addition to the knowledge that he/she needs to possess. Since ideas are only hints at what can be accomplished, they require a human touch, i.e. an effort to understand why they are good, for what purpose, and in which frame of reference. Therefore, idea screening is not only about judging, but also about understanding, sorting, categorizing, and envisioning potential.

6.1 Research contributions

This thesis makes several research contributions. First, it widens the theoretical perspective through which idea screening has been understood before. Specifically, it introduces a conceptual model of an idea for innovation, and outlines a theoreti-

cal framework that can be used to better understand the activities that happen during idea screening. This model and framework shift our attention to the importance of the narratives that the ideas need to communicate in order for them to be considered good (Froehlich et al., 2016; Hietanen et al., 2014; Ulrich et al., 2015). Thus, applying this framework can also help in understanding that idea screening does not always act as a decision gate, but also as a stage where ideas can be refined (Cooper and Sommer, 2016).

Second, this study shows that certain types of evaluators can interpret idea screening as a generative stage of the innovation process, and that the values of individual evaluators play an important role in how the evaluators act during this process. A typology of evaluators, that was based on Schwartz (1992) theory of basic human values (e.g. openness to change and conservatism), has been found to influence the evaluators' behaviour. This typology can therefore be used as a tool for finding evaluators who have a higher tendency to explore new ideas (which can be useful during the early stages of idea development) and evaluators who are more conservative during idea screening (which can be useful during later phases of the innovation process).

Third, the findings indicate that holistic idea quality is a constructed concept whereby ideas may be considered to be good for different reasons. During the course of this investigation, it was found that the evaluators can appreciate both incremental and radical ideas (Study 3), but they can also show additional preference if the ideas are: i) easy to do, ii) implementable with the potential for further improvements, iii) are considered good despite their complexity of implementation, iv) show potential but require further improvements, and v) remind the evaluators of something that has worked before (Study 4). Based on this, I claim that good ideas are not created during idea generation and then found during screening; rather, they are created during screening, since the evaluators compare and contrast, analyse, envision, refine and select the ideas that they think can be good.

Finally, when expanding the theoretical framework, and some of the underlining philosophical assumptions, a new type of understanding of the idea screening phenomenon become possible. Instead of focusing on individual conditions and variables, a mechanism-based view allowed me to study configurations of the conditions influencing perceptions of idea quality (Danemark et al., 2002; Ragin, 2008; Sihvonen and Pajunen, 2019). This endeavour showed that, although there are key conditions influencing screening, these are not always necessary and neither are they sufficient to lead to high-quality ideas. More precisely, different conditions act in conjunction with each other and collectively lead to the overall impression of high idea quality. Thus, by understanding how different mechanisms (e.g. individual values, generativity, comprehension, and judgemental screening) function together, it will be possible to understand why certain ideas are considered to be good.

6.2 Managerial implications

As was postulated by Tidd and Bessant (2018), the value of research to innovation managers lies in its ability to guide and improve the understanding of the fundamental challenges associated with the innovation process. By understanding which challenges may lie ahead, managers can choose a path that either faces up to or avoids these challenges, and sometimes even illuminates new paths that can be taken. This study digs deep into the idea screening phenomenon and emphasizes revelations that change the way in which we understand idea screening. The overall implications of the findings suggest that there is an untapped potential as regards how idea screening is conducted, and that the evaluation and selection of ideas for further development could benefit from the evaluators engaging more actively with the ideas. The reason for this is that the evaluators who possess the relevant knowledge and who have the ability to be creative can integrate their understandings and improve ideas that they consider good.

Furthermore, during the course of this thesis, a conceptual model of an idea for innovation was developed (Figure 4 on p. 42). This model emphasizes the importance of ideas containing a clear and complete narrative; and was also further shown that this model can be used to improve idea quality. When ideas are more complete and clearly communicated, this helps evaluators to understand them; additionally, having a good understanding of what the idea is proposing improves its use value, originality, and feasibility, leading to a greater holistic perception (Studies 2 and 3). Therefore, a model of an idea for innovation could be directly used by practitioners to clarify that idea's narrative, since this will improve the overall quality of the idea during screening.

It was found that the developing and understanding of the problem that the idea addresses is more important to the evaluators than elaborating upon the solution (Studies 2 and 3). Hence, having a clearer focus on what is important and why it is relevant, when generating new ideas, can also improve the idea's chances of being selected for further development.

Although having ideas that are easy to understand is important, idea screening is a generative process whereby the evaluators can be triggered into seeing the potential value that had not initially been intended by the idea creator. The difficulty of understanding can also trigger the sensemaking process whereby the idea can be made sense of and further improved by the evaluator. By embracing the generative mode of idea screening, the evaluators can counteract the initial difficulty of understanding and come up with new insights regarding the idea (Studies 3 and 4).

The data from Study 3 suggests that evaluators who are more open to change than conservative could be triggered into refining ideas more, and not be as fixated upon an idea's feasibility as the evaluators who have conservative values. Hence, Schwartz (1992) typology of openness to change, and the operationalization that

was used in Study 3, can be used by organizations to find the evaluators who are more inclined to favour novel ideas of high use value, and to perform generative idea screening.

The presence of sensemaking and idea improvement activities, which were found in Studies 3 and 4, indicates that the evaluators perform idea refinement activities even during screening. This potential can be harvested by including idea refinement in screening, for the best ideas. Incorporating this could enhance the effectiveness of the innovation process, since the person evaluating could simultaneously contribute to the idea's further development, and the different stages of the fuzzy front-end phase could also occur simultaneously. This concept of merging the boundaries between the different stages of the innovation process has been gaining attention in recent research, e.g. the Agile-Stage-Gate process (Cooper and Sommer, 2016), as well as advancements in design research (e.g. Dorst, 2011; Le Glatin et al., 2017; Le Masson et al., 2019; Liu et al., 2014). However, due to the popularity of innovation contests at organizations, the challenge of allocating resources in order to process large quantities of ideas, and to then implement these ideas, remains (Adamczyk et al., 2012). This means that there is both an opportunity and a need for methods and practices that can incorporate generative and judgmental screening on a larger scale, something which could be an endeavour aimed at improving idea screening and the way in which organizations approach their innovation processes.

6.3 Limitations and future research

During the course of the research process, I attempted to understand how evaluators think, make sense of ideas, and produce judgements. However, it is important to clarify that this thesis was limited to the context of early idea screening at technology-orientated organizations. Study 1 was heavily based on design and engineering problems, with the examples coming from research studies in telecommunications and the IT industry. Although the model of an idea for innovation developed in Study 1 may have more general implications for the innovation process, it should be noted that its initial intention addressed the technological context. Study 2 involved ideas for technology-based public transport services. Study 3 examined idea evaluations at an IT consultancy, while Study 4 looked at how evaluators from manufacturing and IT industries screen different types of early ideas. The reason for using these contexts was that, in all these cases, each respective organization had a similar structure in its innovation process, employing idea screening as a formal stage during the early phases of this process. My initial desire was to understand how idea screening was carried out when it was a part of the formal innovation process; thus, a purposeful sampling strategy was implemented across the individual studies.

The ideas that were used in the individual studies were all described in textual format, and did not contain any visual images or represent any developed product descriptions. This was done in order to ensure comparability between the studies, so that the task of idea screening was presented in a similar way. The thesis explicitly focused on the individual evaluators, and not on groups, panels or organizational level processes, limiting the theoretical explanations of the empirical phenomena to excluding group or team screening/decision-making activities.

Furthermore, this study did not explicitly measure or select individuals based on the basis of their domain knowledge, or specific types of ideas, something which has been the specific focus of previous research (e.g. Denker, 2018). Instead, in order to produce new insights, data collection occurred in close proximity to real-life situations involving different types of evaluators, capturing both user and producer perspectives. The intention here was to understand the general tendencies that the evaluators experience, ultimately revealing the fact that both users and producers exhibit similar behaviours and face similar challenges during idea screening. Nevertheless, the emphasis was on the expert evaluators (who viewed ideas from the producer perspective) during the later phases of this investigation. This interest in studying expert evaluators in more detail was attributable to the fact that individuality may play an important role when screening is carried out by a small number of experts at an organization (Rogers, 1995).

With regard to the generalization of these findings, the conditions and the mechanisms that were outlined were theoretically supported, and were hence considered generalizable to similar contexts of early idea screening. However, since the thesis mainly focused on extending our current understanding of the idea screening phenomenon, the claims made in this thesis should be viewed as propositions rather than normative statements. In order to further validate these findings, future research needs to more rigorously test, for example the influence of individual human values on generativity and decision-making outcomes. Doing so will clarify whether or not a typology of evaluators, on the basis of their values, is a useful tool for identifying people who would be more inclined to act in a generative manner and be able to improve ideas even during screening.

Based on the findings of this study, idea refinement plays an important role in idea screening. This means that future research could also investigate what types of refinement activities occur and how these can be leveraged in order to improve the overall innovation process. A potential avenue of research could incorporate both a technical perspective on the refinement activities, i.e. the output and quality of ideas produced during refinement, but also using a generative perspective, i.e. the potential increase in legitimacy, and the new insights produced by the people engaged in this activity. It is also important for future research to stress the importance of examining necessary and sufficient conditions when studying the occurrence of certain phenomena in the context of innovation management. As theorized in this

thesis, various events and conditions act as cues that form mechanisms, which then lead to particular outcomes. This perspective can help researchers to outline more meaningful explanations of the research phenomenon and help in addressing complex relationships between different conditions.

7 References

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The human side of idea screening

What is a good idea for innovation? This is indeed a fascinating question. Practitioners want to know how to find good ideas that will contribute towards successful innovation projects, while researchers may face the challenging task of understanding what is “good” to begin with. In order to find an answer to this question, I have chosen to focus this doctoral thesis on the phenomenon of idea screening, whereby people engage in the process of determining the quality of ideas for innovations.

In my own view, idea screening is an activity that consists of perception (the process of making sense and becoming aware) and judgement (reaching conclusions about what has been perceived). Breaking down these concepts into further detail has allowed me to zoom in on the core of what leads to the perception of a “good” idea, gradually changing my initial understanding away from “what constitutes a good idea for innovation?” towards “what makes people think that the idea is good?”. This change of perspective emphasizes the importance of the human side of idea screening and feeds further into a discussion about whether ideas present opportunities that can be discovered, or whether ideas are constructed by the people who create these opportunities. The answer is undoubtedly – both.

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